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STUDIES
OF
NATURE.

VOL. III.

Rafojw Skoyak 1808

STUDIES

OF

N A T U R E.

BY

JAMES-HENRY-BERNARDIN

DE SAINT-PIERRE.

........MISERIS SUCCURERE DISCO.

TRANSLATED BY

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EXPLANATION *of the* PLATES.

FLOWERS. PLATE III.

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AS the explanation of this Plate is inſerted in the text, all I ſhall ſay of it here is this, that all the forms of flowers, which have a direct relation to the Sun, may be reduced to thoſe five primary patterns of flowers, to reverberated perpendicular, conic, ſpheric, elliptic, and plane or parabolic; and flowers which have negative relations to the Sun, to the five other patterns of flowers in paraſol, which are here repreſented in contraſt with the firſt. At the ſame time, though theſe laſt be of forms much more diverſified than reverberated flowers, all their negative ſpecies may be referred to thoſe five poſitive forms.

I am of opinion, that if there were added to thoſe five poſitive, or primordial forms, a certain number of accents, to expreſs the modifications of them, we ſhould have the true characters of the florification, and an alphabet of that agreeable part of vegetation. I likewiſe preſume, that by means of this alphabet, it might be poſſible to characterize, on geographical Charts, the different ſites of the vegetable kingdom.

kingdom. It would be ſufficient to apply the ſigns of them to the foreſts which are there repreſented; for on ſeeing in the Chart, for the ſake of ſuppoſition, that of the reverberated perpendicular, expreſſed by an ear of corn, or a prominent cone, we ſhould inſtantly diſtinguiſh in it the foreſts of the North, or thoſe of cold and lofty mountains. Particular accents, ſuperadded to this character of prominent cone, would diſtinguiſh from each other the pine, the epicea, the laryx, and the cedar; and rays iſſuing from theſe modified characters, would indicate the extent of the kingdoms of thoſe different ſpecies of trees. The thing is not ſo difficult as may be imagined. Geography eaſily repreſents foreſts upon maps; all that would be farther requiſite, therefore, is to affix to them certain ſigns, in order to aſcertain their ſpecies, and theſe ſigns might likewiſe characterize, as we have ſeen, the latitude, or the elevation of the ſoil. Beſides, we ſhould leave out of ſuch botanical Charts a multitude of political diviſions, the names of which, in large characters, uſeleſsly fill up a great deal of room. We ſhould repreſent in them the domains of Nature only, and not thoſe of men. Thus, by means of theſe botanical ſigns, we might diſtinguiſh, at a ſingle glance, on a map, the productions natural to each ſoil, the foreſts, with their different ſpecies of trees, nay, the meadows too, with the varieties of their herbage. There might be farther conveyed the humidity or the dryneſs of the territory, by adding to the ſigns of the flowers, the characters of the leaves and ſeeds of vegetables. To theſe might afterwards be affixed, on the cities and villages repreſented, ciphers expreſſing the number of Families who inhabit them, as I have ſeen in Turkiſh maps; thus we ſhould have Charts really geographic, preſenting at the firſt glance, an image of the richneſs

and

and of the temperature of the territory, and of the number of it's inhabitants. After all, this is not a plan which I presume to prescribe, but ideas which I have ventured to suggest, to be pursued, improved, and brought to perfection.

VOLATILE GRAINS. PLATE IV.

VOLUME III. PAGE 170.

HERE is preſented, on the one hand, the ſpartha, or ruſh of the Spaniſh mountains, hollowed into a gutter, for the purpoſe of receiving the rain water ; and, on the other, the cylindric or full ruſh of the marſhes. The grain of this laſt reſembles, in it's ſtate of expanſion, the eggs of a lobſter. I have not been able to procure any of the grains of the ſpartha ; but I have no doubt that, in oppoſition to thoſe of the ruſh of the marſhes, it muſt have a volatile character. I do not ſo much as know whether the ſpartha fructifies in our climate. Meſſrs. *Thouin*, the principal gardeners of the Royal Garden at Paris, could eaſily have gratified my curioſity in this reſpect. To theſe gentlemen I ſtand indebted for furniſhing me with moſt of the grains and leaves which I have got engraved for this Work, among others the cone of the cedar of Lebanon ; but accuſtomed, in my ſolitary ſtudies, to inveſtigate, in Nature alone, the ſolution of the difficulties which ſhe throws in my way, I did not make application to them, though their hearts are replete with liberality and complaiſance, toward the ignorant as well as to the learned.

Whatever the caſe may be as to this, it is to the fruit that Nature attaches the character of volatility ; and it is by the leaf that ſhe indicates the nature of the ſite in which the vegetable is deſtined to grow. Accordingly we perceive, in this plate, the cone of the cedar to be compoſed of thin flakes

flakes like the artichoke. Every flake carries it's kernel: such is the one here represented, detached from the cone; and each of them, as the fruit comes to maturity, flies off, by the help of the winds, toward the summit of the lofty mountains, to which it is destined. Remark, likewise, that the leaves of the cedar are filiform, in order to resist the winds, which are violent on lofty mountains, and they are aggregated into clusters resembling pencils, for the purpose of collecting, in the air, the vapours which float about in it. Each leaf of this tree has more than one aqueduct traced in it lengthwise; but as it is extremely minute, it was impossible to express it in the engraving. Farther, that filiform and capillaceous shape, so well adapted to resisting the winds, as well as that which is of the sword-blade form, is common to vegetables of the mountains, such as pines, larches, cedars, palm-trees; it is, likewise, frequently found on the edge of waters equally exposed to violent winds, as in rushes, reeds, the leaves of the willow; but the foliage of these last differs essentially from that of the first, in that there is no aqueduct in it, whereas the leaves of mountain vegetables have one; neither is their aggregation similar.

The dandelion grows, like the cedar, in dry and elevated situations. It's grains are suspended to a complete sphere of shuttle-cocks, which forms outwardly a very regular polyedron, having a multitude of hexagonal, or pentagonal faces. These faces are not expressed in the print, because it has been copied after that of a highly valued Botanical Work, but which, like books in every department of literature, collects only the characters which make for a favourite system. The leaf of the dandelion particularly determines it's natural site; it is broad and fleshy, because expanding

panding itſelf cloſe to the ground, on which it forms ſtars of verdure, it has nothing to fear from the winds: it is deeply indented, like the teeth of a ſaw, for the purpoſe of opening a paſſage to the graſſes; and it's indentings are bent inward to catch the rain-water, and convey it to the roots. Thus Nature adapts the means to each ſubject, and redoubles her attention in proportion to it's weakneſs. The ſphere of the dandelion is more artfully formed than the cone of the cedar, and, beyond all contradiction, much more volatile. It requires a tempeſt to carry the ſeeds of the cedar to any conſiderable diſtance; but the breath of the zephyr is ſufficient to re-ſow thoſe of the dandelion. A Lebanon is likewiſe neceſſary for planting the firſt, but the ſecond needs only a mole-hill. This ſmall vegetable is likewiſe more uſeful in the World than the cedar; it ſerves for food to a great many quadrupeds, and to a variety of ſmall birds, which fatten on it's grains. It is very ſalutary to the human ſpecies, eſpecially in the Spring ſeaſon. We accordingly find great numbers of poor people, at that time, picking up it's young ſhoots in the fields. It is, moreover, the only plant which Nature preſents gratuitouſly to Man in our Climates. It univerſally thrives in dry places, and even in the ſeams of the pavement. It frequently carpets the court-yards of Hotels, the maſters of which are not over-burthened with vaſſals, and ſeems to invite the miſerable to walk in. It's gold-coloured flowers very agreeably enamel the foot of walls, and it's feathered ſphere, raiſed upon a long ſhaft, in the boſom of a ſtar of verdure, is by no means deſtitute of beauty.

It is the leaf, then, which particularly determines the natural ſite of a vegetable; for, as we have ſeen, there are aquatic plants which have their grains volatile, becauſe they

they grow on the brink of lakes or marſhes, which have no currents, ſuch as the willow and the reed ; but their leaves, in that caſe have no aqueduct. Nay, there are ſome which have a pendent direction, and which, from that attitude, refuſe to admit the water from Heaven. The maple of Virginia, which delights in the brinks of lakes, marſhes, and creeks, has grains attached to membranous wings, reſembling thoſe of a fly, as the ſeeds of the mountain maple repreſented in the plate. But there is this remarkable difference between them, that the broad leaf of the firſt is pendent, and attached to a long tail ; that this tail, ſo far from being furniſhed with an aqueduct has a ridge ; and that the leaf of the mountain maple, which is of a moderate ſize, angular and barky, for reſiſting the winds, riſes almoſt vertically, and bears an aqueduct on it's tail, to receive the waters of Heaven.

AQUATIC GRAINS. PLATE V.

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AQUATIC grains have characters entirely oppofite to thofe which are produced on the mountains; if we except, as has been faid, thofe which thrive on the brink of ftagnant waters; but even thefe poffefs, at once, volatile and nautical characters, for they are amphibious. They fwim along the furface of the water, and they fly through the air; fuch is that of the willow, and feveral others. It is the leaf which determines the fite, as we have obferved, for aquatic plants never have any aqueduct on their leaves. Nay, moft of them repel the water. The leaves of the nymphæa and of the reed are never wet. It is likewife fo with thofe of the nafturtium, which are never humid, however copioufly the rain may fall, though that plant is exceffively fond of the water; for the culture of it confumes an incredible quantity. I am perfuaded that if a morafs were fown with plants of this fort, it would be fpeedily dried up. The leaf of the martinia of Vera Cruz, which is here reprefented among aquatic plants, is, on the contrary, always humid. It has even, in it's firft expanfion, a fluting on it's tail. From this double mountain-character, I am difpofed to fufpect that the martinia naturally grows on the parched and fandy fhores of the Sea; for Nature, in the view of varying her harmonies, extends very dry places along the brink of the waters, juft as fhe depofits fheets of water and moraffes in the bofom of mountains. But from the form of the pod of the martinia, which refembles a

hook

hook for fiſhing gilt-heads, I believe it to be deſtined to grow in ſituations expoſed to inundations of the Sea, as is, in fact, the caſe with the territory of Vera Cruz, from whence this ſpecies originally is. I preſume, therefore, that when the ſhores of Vera Cruz are overflowed by high tides, you muſt ſee fiſhes caught by this plant, for the ſtem of it's pod is not eaſily broken off; it's two crotchets are pointed like fiſhing-hooks, are elaſtic, and hard as horn. Beſides, when it is ſoaked in water, it's furrows, ſhaded with black, ſhine as if they were filled with globules of quick-ſilver. Now, the luſtre of this light is a farther bait to attract the fiſhes. I preſent theſe merely as conjectures; but I found them on a principle which is indubitably certain, namely, That Nature has made nothing in vain.

END OF EXPLANATION OF THE PLATES.

STUDIES

OF

NATURE.

SEQUEL OF STUDY X.

OF THE HUMAN FIGURE.

ALL the harmonic expreſſions are combined in the Human Figure. In treating this article, I ſhall confine myſelf to the examination of ſome of thoſe which compoſe the head of Man. Obſerve, it's form is an approximation to the ſpherical, which, as we have ſeen, is *the* form, by way of excellence. I do not believe that this configuration is common to it with that of any animal whatever. On it's anterior part is traced the oval of the face, terminated by the triangle of the noſe, and encompaſſed by the radiations of the hair. The head is, beſides, ſupported by a neck of conſiderably leſs diameter than itſelf, which detaches it from the body by a concave part.

This slight sketch presents to us, at first glance, the five harmonic terms of the elementary generation of forms. The hair exhibits lines; the nose the triangle; the head the sphere; the face the oval; and the void under the chin the parabola. The neck which, like a column, sustains the head, exhibits, likewise, the very agreeable harmonic form of the cylinder, composed of the circular and quadrilateral.

These forms, however, are not traced in a stiff and geometrical manner, but imperceptibly run into each other, and mutually blend, as the parts of the same whole ought to do. Thus the hair does not fall in straight lines, but, in flowing ringlets, harmonizes with the oval of the face. The triangle of the nose is neither acute, nor does it present a right angle; but, by the undulatory swelling of the nostrils, presents a harmony with the heart-form of the mouth, and, sloping toward the forehead, melts away into the cavities of the eyes. The spheroid of the head, in like manner, amalgamates with the oval of the face. The same thing holds with respect to the other parts, as Nature employs, in their general combination, the roundings of the forehead, of the cheeks, of the chin, of the neck, that is, portions of the most beautiful of harmonic expressions, which is the sphere.

There

There are, farther, ſeveral remarkable proportions which form, with each other, very pleaſing harmonies and contraſts: ſuch is that of the forehead, which preſents a quadrilateral form, in oppoſition to the triangle, compounded of the eyes and the mouth; and that of the ears, formed of very ingenious acouſtic curves, ſuch as are not to be met with in the auditory organ of animals, becauſe, in the caſe of mere animals, it is not intended to collect, like that of Man, all the modulations of ſpeech.

But I muſt be permitted to expatiate, ſomewhat more at large, on the charming forms, aſſigned by Nature to the eyes and the mouth, which ſhe has placed in the full blaze of evidence, becauſe they are the two active organs of the ſoul. The mouth conſiſts of two lips, of which the upper is moulded into the ſhape of a heart, that form ſo lovely, as to have become proverbial for it's beauty; and the under is rounded into a demi-cylindric ſegment. In the opening between the lips, we have a glimpſe of the quadrilateral figure of the teeth, whoſe perpendicular and parallel lines contraſt moſt agreeably with the round forms adjoining, and ſo much the more, as we have ſeen, that the firſt generative term being brought into union with the ſupremely excellent harmonic term, that

is, the ſtraight line with the ſpherical form, the moſt harmonic of all contraſts reſults from it.

The ſame relations are to be found in the eyes, the forms of which combine ſtill more the harmonic elementary expreſſions; as it was fit the chief of all the organs ſhould do. They are two globes, fringed on the lids with eye-laſhes, radiating with divergent pencil-ſtrokes, which form with them a moſt delightful contraſt, and preſent a ſtriking conſonance with the Sun, after which they ſeem to have been modelled, having, like that orb, a ſpherical figure, encircled with divergent rays, in the eye-laſhes; having a movement of ſelf-rotation, and poſſeſſing the power, like him, of veiling themſelves in clouds, by means of their lids.

The ſame elementary harmonies may be traced in the colours of the head, as well as in it's forms; for we have in the face, the pure white exhibited in the teeth and in the eyes; then the ſhades of yellow, which diſſolve into it's carnation, as the Painters well know; after that the red, the eminently excellent colour, which glows on the lips and on the cheeks. You farther remark the blue of the veins, and ſometimes that of the eye-balls; and, finally, the black of the hair which, by it's oppoſition, gives relief to the colours of the face,

as

as the vacuum of the neck detaches the forms of the head.

You will pleafe to obferve, that Nature employs not, in decorating the human face, colours harfhly oppofed; but blends them, as fhe does the forms, foftly and infenfibly into each other. Thus, the white melts here into the yellow, and there into the red. The blue of the veins has a greenifh caft. The hair is rarely of a jet black; but brown, chefnut, flaxen, and, in general, of a colour into which a flight tint of the carnation enters, in order to prevent a violently harfh oppofition. You will farther obferve, that as fhe employs fpherical fegments in forming the mufcles which unite the organs, and in order particularly to diftinguifh thefe very organs, fhe makes ufe of red for the fame purpofes. She has, accordingly, extended a flight fhade of it to the forehead, which fhe has ftrengthened upon the cheeks, and which fhe has applied pure and unmixed to the mouth, that organ of the heart, where it forms a moft agreeable contraft with the whitenefs of the teeth. The union of this colour, with that harmonic form, is the moft powerful confonance of beauty; and it is worthy of remark, that wherever the fpherical forms fwell, there the red colour ftrengthens, except in the eyes.

As the eyes are the principal organs of the ſoul, they are deſtined to expreſs all it's emotions; which could not have been done with the harmonic red tint, for this would have given but one ſingle expreſſion. Nature, in order there to expreſs the contrary paſſions, has united in the eye the two moſt oppoſite of colours, the white of the orbit and the black of the iris, and ſometimes of the ball, which form a very harſh oppoſition, when the globes of the eyes are diſplayed in the full extent of their diameter; but by means of the eyelids, which Man can contract, or dilate, at pleaſure, he is enabled to give them the expreſſion of all the paſſions, from love to fury.

Thoſe eyes whoſe balls are blue are naturally the ſofteſt, becauſe the oppoſition, in this caſe, is leſs harſh with the adjacent white; but they are the moſt terrible of all when animated with rage, and this from a moral contraſt, which conſtrains us to conſider thoſe as the moſt formidable of all objects, that menace evil, after having encouraged us to expect good. Perſons, therefore, who are thus diſtinguiſhed, ought to be carefully on their guard againſt treachery to that character of benevolence beſtowed on them by Nature; for blue eyes expreſs, by their colour, ſomething enchantingly celeſtial.

As

As to the movements of the muſcles of the face, it would be extremely difficult to deſcribe them, though I am fully perſuaded it might be poſſible to explain their Laws. Whoever ſhall attempt this, muſt of neceſſity refer them to the moral affections. Thoſe of joy are horizontal, as if the ſoul, in the enjoyment of felicity, had a diſpoſition to extend itſelf. Thoſe of chagrin are perpendicular, as if, under the preſſure of calamity, the mind was looking toward Heaven for refuge, or ſeeking it in the boſom of the earth. Into ſuch an explanation of the Laws of muſcular motion muſt likewiſe enter, the alterations of colours, and the contractions of forms, and in theſe, at leaſt, we ſhall diſcover the truth of the principle which we have laid down, that the expreſſion of pleaſure is in the harmony of contraries, blending with each other in colours, forms, and motions; and that the expreſſion of pain conſiſts in the violence of their oppoſitions. The eyes alone have motions ineffable; and it is remarkable, that, under the influence of very ſtrong emotions, they are ſuffuſed with tears, and thus ſeem to have a farther analogy with the orb of day, who, in the ſeaſon of tempeſts, ſhrouds himſelf in rainy diſtillations.

The principal organs of ſenſe, four of which are placed in the head, have particular contraſts, which detach

detach their ſpherical forms, by means of radiated forms; and their ſhining colours by means of duſky tints. Thus the bright organ of viſion is contraſted by the eye-brows; thoſe of ſmell and taſte, by the muſtaches; the organ of hearing, by that part of the hair called the *favourite* lock, which ſeparates the ear from the face; and the face itſelf is diſtinguiſhed from the reſt of the head, by the beard, and by the hair.

We ſhall not here examine the other proportions of the human figure in the cylindric form of the neck, oppoſed to the ſpheroïd of the head, and to the plane ſurface of the breaſt; the hemiſpherical forms of the paps, which contraſt with the flatneſs of the cheſt; as well as the cylindrical pyramids of the arms and fingers with the omoplate of the ſhoulders; the conſonances of the fingers with the arms, by means of three ſimilar articulations, with a multitude of other curvatures, and of other harmonies, which, hitherto, have not ſo much as a name in any language, though they are, in every country, the all-powerful expreſſion of beauty.

The human body is the only one which unites, in itſelf, the modulations, and the concerts, inexpreſſibly agreeable, of the five elementary forms, and of the five primordial colours, without exhibiting any thing of the harſh and rude oppoſitions perceptible

perceptible in the brute creation, ſuch as the prickles of the hedge-hog, the horns of the bull, the tuſks of the wild-boar, the fangs of the lion, the marbled ſkin of the dog, and the livid and diſguſting colours of venemous animals. It is the only one of which the firſt touch is perceptible, and which you can ſee completely; other animals being diſguiſed under hair, or feathers, or ſcales, which conceal their limbs, their ſhape, their ſkin. Farther, it is the only form which, in its perpendicular attitude, diſplays all it's poſitions and directions at once; for you can hardly perceive more of a quadruped, of a bird, of a fiſh, than one half, in the horizontal poſition which is proper to them, becauſe the upper part of their body conceals the under.

We muſt, likewiſe, remark, that Man's progreſſive motion is ſubject to neither the ſhocks, nor the tardineſs of movement of moſt quadrupeds, nor to the rapidity of that of birds; but is the reſult of movements the moſt harmonic, as his figure is, of forms, and of colours, the moſt delightful *.

The

* It has been maintained by certain celebrated Authors, that the Negros conſider their own colour as more beautiful than that of the whites; but it is a miſtake. I have put many a queſtion, on this ſubject, to black people, who were in my own

The more that the multiplied conſonances of the human figure are agreeable, the more diſguſting are it's diſſonances. This is the reaſon that, or

own ſervice, in the Iſle of France, and who were at perfect liberty to tell what they really thought, eſpecially on a ſubject ſo indifferent to ſlaves, as the beauty of the whites. I ſometimes aſked them whether of the two they would prefer, a black wife, or a white? They never heſitated an inſtant in declaring their preference of the white woman. Nay, I have ſeen a Negro, who had been almoſt flead alive by the whip, in one of our plantations, expreſs the higheſt delight when the ſcars of his ſores began to whiten, becauſe it ſuggeſted the hope, that he was thereby going to change colour, and to be negro no longer. The poor wretch would gladly have parted with his whole hide to become white. This preference, we ſhall be told, is, in that caſe, the effect of the ſuperiority which they are obliged to aſcribe to the Europeans. But the tyranny of their maſters ought rather to inſpire abhorrence of the colour. Beſides, the black men and women, of our colonies, expreſs the ſame taſtes that our peaſantry at home do, for ſtuffs of lively and glaring colours. Their ſupreme luxury in dreſs is a red handkerchief tied round their head. Nature has beſtowed no other tints on the roſes of Africa than upon thoſe of Europe.

If the judgment of black ſlaves is conſidered as a ſuſpicious authority on the ſubject, we may refer the deciſion to the taſte of the Sovereigns of Africa, who are under no temptation to diſſemble. They fairly acknowledge that in this, as well as in many other reſpects, they have been more hardly dealt with than the Europeans. African Princes have made frequent application to the Governors of the Engliſh, Dutch, and French ſettlements on the coaſt, for white women, under a promiſe of very ample privileges in return. *Lamb*, an Engliſh agent at Ardra,

on the face of the Earth, there is nothing ſo beautiful as a handſome man, nor ſo ſhocking as a very ugly one.

This

Ardra, when priſoner to the King of Dahomay, in the year 1724, ſent word to the Governor of the Engliſh fort at Juida, that if he could ſend a white woman, or even a mulatto, to this Prince, ſhe might acquire an unbounded influence over his mind. (*General Hiſtory of Voyages, by the Abbé Prevoſt.* Book viii. page 96.)

Another King, on a different part of the coaſt of Africa, promiſed, one day, to a Capuchin miſſionary, who was preaching the Goſpel in his preſence, to diſmiſs his ſeraglio, and embrace Chriſtianity, if he would procure him a white woman to wife. The zealous miſſionary immediately repaired to the neareſt Portugueze ſettlement; and having enquired, whether there might not be among them ſome poor and virtuous damſel, ſuch as might ſuit his purpoſe, he was informed of ſuch a perſon, the niece of a very poor man of family, who lived in a ſtate of great privacy. He waited for her one Sunday morning, at the door of the church, as ſhe was returning from maſs with her kinſman; and addreſſing himſelf to the uncle, before all the people, charged him, in the name of God, and as he valued the intereſts of religion, that he would beſtow his niece in marriage on the Negro King. The gentleman and his niece having given their conſent, the black Prince married her, after having diſmiſſed all his other women, and received public baptiſm. (*Hiſtory of Ethiopia, by Labat.*)

The beſt informed travellers relate many ſuch anecdotes, of a ſimilar preference expreſſed by the black Sovereigns of Africa, and of ſouthern Aſia. *Thomas Rowe*, Ambaſſador from England at the Court of the Mogul *Selim-Scha*, relates, that a very cordial reception was given, by this powerful Monarch, to certain

This farther ſuggeſts a reaſon why it will be for ever impoſſible for art to produce a perfect imitation of the human figure, from the difficulty of uniting

tain Portugueze Jeſuits, who had come as miſſionaries into his dominions, with a view to obtain, through their means, ſome women of their country to recruit his ſeraglio. He began with conferring on them ſingular privileges; had apartments provided for them in the vicinity of his palace, and admitted them to his moſt intimate familiarity: but perceiving that thoſe good fathers diſcovered no great inclination to gratify his deſires, he practiſed a very ingenious artifice to draw them into compliance. He expreſſed an extreme partiality to the Chriſtian Religion; and pretending that he was reſtrained, merely by reaſons of State, from openly embracing it, he gave ſtrict orders to two of his nephews to attend punctually on the catechetical inſtructions of the miſſionaries. When the young men had acquired a competent degree of knowledge, he enjoined them to get themſelves baptized, and, this being complied with, he thus addreſſed them: "It is now no longer in your power to marry "pagan women, and of this country; for you have made pro-"feſſion of Chriſtianity. It is the duty of the fathers, who "baptized you, to procure you wives. Tell them they muſt "ſend to Portugal for women to be your brides." The young proſelytes did not fail to make this demand on the good fathers; who, ſuſpecting that the Mogul's real intention, in marrying his nephews to Portugueze wives, was to procure a ſupply of white women for his ſeraglio, refuſed to engage in this negociation. Their refuſal highly incenſed *Selim Scha*, and expoſed them to much perſecution: he immediately commanded his nephews to renounce Chriſtianity. (*Memoirs of Thomas Rowe, Thevenot's Collection.*)

The black colour of the ſkin is, as we ſhall preſently ſee, a bleſſing

uniting in it all the harmonies, and from the ſtill greater difficulty of effecting a complete combination of thoſe which are of a different nature. For example, the Painter may ſucceed tolerably in imitating the colours of the face, and the Sculptor in expreſſing it's forms. But were an attempt made to unite the harmony of colours and of forms in a ſingle buſt, ſuch a production will be very inferior to a mere picture, or to a mere piece of ſculpture, becauſe it will combine particular diſſonances of colours and of forms, beſides their general diſſonance, which is ſtill more marked. If

bleſſing from Heaven to the Nations of the South, becauſe it abſorbs the reflexes of the burning Sun under which they live. But the men of thoſe Nations do not the leſs, on that account, conſider white women as more beautiful than the black, for the ſame reaſon that they think the day more beautiful than the night, becauſe the harmonies of colours and of lights render themſelves perceptible in the complexion of the whites, whereas they almoſt entirely diſappear in that of the blacks, who can pretend to no competition with the others, in point of beauty, except as to form and ſtature.

The proportions of the human figure, having been taken, as we have juſt ſeen, from the moſt beautiful forms of Nature, are become, in their turn, models of beauty for Man. If we attend to this, we ſhall find, that the forms which pleaſe us moſt in works of art, as thoſe of antique vaſes, and the relations of height and breadth in monuments, have been taken from the human figure. It is well known that the Ionic column, with it's capital and it's flutings, was imitated after the ſhape, the head-dreſs, and the drapery of the Grecian young women.

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to theſe it were farther attempted to add the harmony of movements, as in the caſe of an automaton, this would only aggravate the incongruity. Were art to continue it's effort, and try to beſtow the gift of ſpeech likewiſe, this muſt produce a fourth diſſonance, which would be abſolutely hideous; for here the intellectual ſyſtem would claſh frightfully with the phyſical ſyſtem. It is, accordingly, matter of no ſurpize to me, that St. *Thomas Aquinas* was ſo ſhocked at the ſpeaking head, in conſtructing which, his maſter, *Albert the Great*, had employed ſo many years, that, under the influence of horror, he inſtantly broke it to ſhivers. It muſt have produced on him the ſame impreſſion which he would have felt, had he heard an articulate voice iſſuing out of a dead man's mouth. Such labours, in general, do the Artiſt much honour; but they demonſtrate the weakneſs of art, which falls below Nature juſt in proportion as it aims at uniting more of her harmonies. Inſtead of blending them, as Nature herſelf does, art can only place them in oppoſition.

All this proves the truth of the principle which we have laid down, namely, that harmony reſults from the union of two contraries, and diſcord from their colliſion: and the more agreeable that the harmonies of an object are, the more diſguſting are it's diſcordances. This is the real origin of

of pleaſure and of diſlike, in phyſics as in morals, and the reaſon why the ſame object ſo frequently excites affection and averſion.

A great variety of very intereſting reflections remain to be made on the human figure, eſpecially by connecting with it the moral ſenſations, which alone give expreſſion to the features. We ſhall introduce ſome of theſe in the ſequel of this Work, when we come to ſpeak of ſentiment. Be it as it may, the phyſical beauty of Man is ſo ſtriking, in the eyes even of the animal creation, that to it, principally, muſt be aſcribed the empire which he exerciſes over them, in every part of the Earth. The feeble flee for refuge under his protection, and the moſt powerful tremble at ſight of him. *Mathiola* relates, that the lark will ſave herſelf amidſt troops of men, when ſhe perceives the bird of prey hovering over her. The reality of this inſtinct was confirmed to me by an officer, who was once an eye-witneſs of one, in ſuch circumſtances, fleeing for ſafety among a very diſtinguiſhed ſquadron of cavalry, in which he then ſerved; but the trooper whoſe particular protection ſhe ſought, trampled her to death under his horſe's feet; a moſt barbarous action, which drew on him, and juſtly, the indignation of every good man in the corps.

I myſelf have ſeen a ſtag, when run down by the hounds, appeal, with ſobs, for relief, to the compaſſion of perſons accidentally paſſing that way. *Pliny* relates a ſimilar fact, and it is conſiſtent with my own experience, when I was in the Iſle of France, which I have detailed in the journal of my voyage to that Iſland. I have ſeen, in the farm-yards, the India-hens, under the impulſe of love, go and throw themſelves chuckling at the feet of the country-people. If we meet leſs frequently with inſtances of the effect of animal confidence in Man, it is becauſe of the noiſe of our fowling-pieces, ſcaring them inceſſantly, and of the continual other perſecutions which they are doomed to undergo.

It is well known with what familiarity the monkeys, and fowls of all kinds, approach travellers in the foreſts of India *. I have ſeen at the Cape of Good-Hope, in Cape-town itſelf, the ſhores of the Sea ſwarming with water-fowls, which perched confidently on the ſhallops, and a large wild pelican playing cloſe by the cuſtom-houſe, with a great dog, whoſe head ſhe took into her enormous beak. This ſpectacle conveyed to me, from the moment of my arrival, a moſt powerful impreſſion

* See *Bernier* and *Mandeſlo*.

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in favour of the happineſs of that country, and of the humanity of it's inhabitants: nor did my conjecture deceive me.

But dangerous animals, on the contrary, are ſeized with terror at the ſight of Man, unleſs they be driven from their natural bias by ſome preſſing neceſſity. An elephant will ſuffer himſelf to be led about, in Aſia, by a little child. The African lion retires, growling, from the cabin of the Hottentot; ſurrenders up to him the poſſeſſions of his anceſtors, and ſeeks for himſelf a kingdom far remote, in foreſts, and among rocks, untrodden by the foot of Man. The immenſe whale, amidſt his native element, trembles, and flees away before the puny bark of the Laplander. And thus, to this day, is executed that all-potent Law, which ſecured empire to Man, though ſunk into guilt and wretchedneſs: "And the fear of you, and "the dread of you, ſhall be upon every beaſt of "the earth, and upon every fowl of the air; upon "all that moveth upon the earth, and upon all "the fiſhes of the ſea; into your hand are they "delivered *."

It is ſingularly remarkable, that, through the whole extent of Nature, there is no animal what-

* Geneſis, chap. ix. ver. 2.

ever, nor plant, nor foſſil, nor even globe, but what has it's conſonance and it's contraſt out of itſelf, Man excepted. No one viſible being enters into ſociety with him, but either as his ſervant or as his ſlave.

We muſt, undoubtedly, reckon, among the human proportions, that Law ſo univerſal, and ſo wonderful, which produces males and females in equal numbers. Did chance preſide over the generation of the human race, as over our alliances, we ſhould one year have an unmixed crop of male children, and another, a race entirely female. Some nations would conſiſt wholly of men, and others, wholly of women; but all over the Globe, the two ſexes are born, within the ſame ſpace of time, equal in number. A conſonance ſo regular, clearly demonſtrates, that a Providence is continually watching over the affairs of Mankind, notwithſtanding the abſurdity and diſorder of human inſtitutions. This may be conſidered as a ſtanding teſtimony to the truth of our Religion, which, likewiſe, limits Man to one Woman in marriage, and by this conformity to natural Laws, peculiar to itſelf, ſeems alone to have emanated from the Author of Nature. It may fairly be concluded, on the contrary, that a religion which permits, or connives at, a plurality of wives, muſt be erroneous.

Ah!

Ah! how little acquainted are they with the Laws of Nature, who, in the union of the two ſexes, look for nothing farther than the pleaſures of ſenſe! They are only culling the flowers of life, without once taſting of it's fruit. The fair ſex! this is the phraſe of our men of pleaſure; women are known to them under no other idea. But the ſex is fair only to perſons who have no other faculty except that of eye-ſight. Beſides this it is, to thoſe who have a heart, the creative ſex which, at the peril of life, carries Man, for nine months, in the womb; and the cheriſhing ſex, which ſuckles and tends him in infancy. It is the pious ſex which conducts him to the altar while he is yet a child, and teaches him to draw in, with the milk of the breaſt, the love of a religion which the cruel policy of men would frequently render odious to him. It is the pacific ſex, which ſheds not the blood of a fellow-creature; the ſympathizing ſex, which miniſters to the ſick, and handles without hurting them.

To no purpoſe does Man pretend to boaſt of his power and his ſtrength; if his robuſt hands are able to ſubdue iron and braſs, thoſe of the woman, more dextrous, and more uſefully employed, can ſpin into threads the flax and the fleeces of the ſheep. The one encounters gloomy care with the maxims of philoſophy; the other

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banifhes it by fportivenefs and gaiety. The one oppofes to external evils the force of his reafon; the other, far happier, eludes them by the mobility of her's. If the man fometimes confiders it as his glory to bid defiance to danger in the field of battle, the woman triumphs, in calmly meeting dangers more inevitable, and frequently more cruel, on her bed, and under the banners of pleafure. Thus, they have been created to fupport together the ills of life, and to form, by their union, the moft powerful of confonances, and the fweeteft of contrafts.

I am obliged, by the plan of my Work, to proceed forward, and to refrain from purfuing my reflections on fubjects fo interefting as the marriage, and the beauty, of Man and Woman. I muft, however, hazard fome farther obfervations, extracted from my ftore, in order to induce others to dive into this rich mine, with the additional value of novelty.

All Philofophers who have made Man their particular ftudy, are agreed, and with good reafon, that he is the moft wretched of all animals. Moft of them appear to have been fenfible, that an affociate was neceffary to him, to relieve his burthens, and they have made his happinefs, in part, to confift of friendfhip; which is an evident demonftration

tion of human weakneſs and miſery; for were Man naturally ſtrong, he would ſtand in no need of either aſſociate or aſſiſtance. Elephants and lions live ſolitary in the foreſts. They need no friends, becauſe Nature has made them ſtrong.

It is very remarkable that, when the Ancients give us a repreſentation of perfect friendſhip, it is always reſtricted to two, and no more, whatever may be the extent of human weakneſs; for Man is frequently reduced to the neceſſity of deriving his felicity from the concurring interpoſition of many beings ſimilar to himſelf. Several reaſons may be aſſigned for this reſtriction, the principal of which are deducible from the nature of the human heart, which, from it's very weakneſs, is capable of attaching itſelf to only one object at once; and which, being compounded of oppoſite paſſions, that maintain a perpetual counterpoiſe, is, in ſome ſenſe, both active and paſſive, and ſtands in need of loving and of being beloved, of comforting and of being comforted, of honouring and of being honoured, and ſo on. Accordingly, all the friendſhips celebrated in the hiſtoric page, exiſted only between two perſons; ſuch as thoſe of *Caſtor* and *Pollux*; of *Theſeus* and *Perithoüs*; of *Hercules* and *Iolas*; of *Oreſtes* and *Pylades*; of *Alexander* and *Hepheſtion*, and many others.

It is farther to be remarked, that thofe fingular friendfhips have ever been affociated with virtuous and heroic actions; but whenever the union comprehended more perfons than two, it was fpeedily diffolved by difcord, or, if permitted to fubfift for any length of time, became famous only for the mifchief which it brought on Mankind: fuch was that of the triumvirate among the Romans. In cafes when the affociates, in fuch alliances, were ftill more numerous, the mifchief which they did was always in proportion to the greatnefs of the number of which they confifted. Thus, the tyranny of the Decemviri at Rome exhibited a violence ftill more cruel than that of the Triumviri, for it fpread deftruction, we may venture to fay, without paffion, and in cold blood.

There are, likewife, triummillvirates, and decemmillvirates: thefe are your various defcriptions of Corps. With good reafon have they obtained the appellation of *Corps*; for they frequently have a centre diftinct from their Country, of which they ought only to be members. They have, likewife, views diftinct from thofe of their Country, a diftinct ambition, and diftinct interefts. They are, with relation to the reft of the citizens, inconftant, detached, deftitute of an object, and frequently deftitute alfo, of the fpirit of patriotifm: that, in a word,

a word, which regular troops are with relation to light troops. They will not ſuffer them to appear in an avenue along which they themſelves are advancing, and diſpoſſeſs them of the poſts which they may have occupied, the whole length of their route. How many revolutions have been effected in Ruſſia by the Strelitzes; in Rome, by the Pretorian guards; at Conſtantinople, by the Janizaries; and elſewhere, by Corps ſtill more political! Thus, by a juſt re-action of Providence, the ſpirit of Corps has been as fatal to countries, as the ſpirit of Country has itſelf been to Mankind.

If the heart of Man admits of but a ſingle object, what judgment ſhall we form of our modern friendſhips, embracing, as they do, ſuch a multiplicity? Undoubtedly, if a man has thirty friends, he can beſtow on each of them only the thirtieth part of his affection, and can receive, in return, no greater proportion of theirs. He muſt of neceſſity, therefore, deceive them, and be deceived by them; for no one is diſpoſed to be a friend by fractions.

But, if the truth may be told, ſuch friendſhips are merely confederacies of ambition; relations intereſted and purely political, employed entirely in practiſing mutual illuſion, in the view of aggrandizing themſelves at the expenſe of Society; and

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which would be productive of unſpeakable miſchief, were they more clearly united among themſelves, and unleſs they were counterbalanced by oppoſite confederacies. Almoſt all our general aſſociations, accordingly, iſſue in inteſtine wars. On the other hand, I do not ſpeak of the inconveniencies which reſult from particular unions, rather too intimate. The moſt celebrated friendſhips of Antiquity have not been, in this reſpect, wholly exempt from ſuſpicion, though, I am perſuaded, they were as virtuous as the perſons who were the objects of them.

The AUTHOR of Nature has given to each of us, in our own ſpecies, a natural friend, completely adapted to all the demands of human life, capable of ſupplying all the affections of the heart, and all the reſtleſſneſs of temperament. He ſays, from the beginning of the World: "It is not "good that the man ſhould be alone: I will make "him an help meet for him;—and the LORD-"GOD made Woman, and brought her unto the "Man *." Woman pleaſes all our ſenſes by her form and by her graces. She has, in her character, every thing that can intereſt the heart of Man, and at every ſtage of human life. She merits, by the long and painful ſolicitudes which ſhe exerciſes

* Geneſis, chap. ii. ver. 18, 22.

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over our infancy, our respect as a mother, and our gratitude as a nurse; afterward, as Man advances to youth, she attracts all his love as a mistress; and in the maturity of manhood, all his tenderness as a wife, his confidence as a faithful steward, his protection, as being feeble; and, even in old-age, she merits our highest consideration, as the source of posterity, and our intimacy, as a friend who has been the companion of our good and bad fortune through life. Her gaiety, nay, her very caprices, balance, at all seasons, the gravity, and the over-reflective constancy of Man, and acquire, reciprocally, a preponderancy over him.

Thus, the defects of the one sex, and the excess of the other, are an exact mutual compensation. They are formed, if I may use the expression, to be grooved into each other, like the corresponding pieces of carpenters-work, the prominent and retreating parts of which constitute a vessel, fit to launch on the stormy ocean of life, and to attain additional strength from the very buffetings of the tempest. Had we not been informed by a Sacred Tradition, that Woman was extracted from the side of Man; and though this great truth were not every day manifested, in the wonderful birth of the children of the two sexes, in equal numbers, we should be speedily instructed in it by our wants. Man without the Woman, and Woman without

without the Man, are imperfect beings, in the order of Nature. But, the greater contraſt there is in their characters, the more complete union there is in their harmonies. It is, as we have already briefly hinted, from their oppoſitions in talents, in taſtes, in fortunes, that the moſt intenſe and the moſt durable affection is produced. Marriage is, therefore, the friendſhip of Nature, and the only real union which is not expoſed, like thoſe which exiſt among men, to eſtrangement, to rivalſhip, to jealouſies, and to the changes which time is effecting in our inclinations.

But, Wherefore are there ſo few happy marriages among us? I anſwer, becauſe with us the ſexes have diveſted themſelves each of it's proper nature, and aſſumed the other. It is becauſe the women, with us, adopt the manners of men, from education; and men the manners of women, from habit. The women have been deſpoiled of the graces, and of the talents, peculiar to their ſex, by the maſters, the ſciences, the cuſtoms, the occupations of men. There is no way left, ſave one, but that is infallible, to bring both back to Na ture; it is to inſpire them with a taſte for Religion. By Religion, I do not mean attachment to ceremonies, nor ſyſtems of Theology; but the religion of the heart, pure, ſimple, unoſtentatious; ſuch as it is ſo beautifully depicted in the Goſpel.

Religion

Religion will reſtore to the two ſexes, not only their moral character, but their phyſical beauty. It is not climate, it is not aliment, it is not bodily exerciſe, nor all theſe together, which form human beauty; it is the moral ſentiment of virtue, which cannot ſubſiſt independantly of Religion. Aliment and exerciſe, no doubt, contribute greatly to the magnitude and the expanſion of the body; but they have no manner of influence on the beauty of the face, which is the true phyſionomy of the ſoul. It is by no means uncommon to ſee perſons tall and robuſt diſguſtingly ugly; with the ſtature of a giant, and the face of a monkey.

Beauty of face is to ſuch a degree the expreſſion of the harmonies of the ſoul, that, in every country, thoſe claſſes of citizens who are, from their condition, obliged to live with others in a ſtate of conſtraint, are ſenſibly the homelieſt of the ſociety. The truth of this obſervation may be aſcertained, particularly among the nobleſſe of many of our provinces, who live with each other in the perpetual jealouſy of rank, and with their neighbours of an inferior order, in a ſtate of unremitting hoſtility, for the maintenance of their prerogatives. Moſt of thoſe Nobles preſent a complexion bilious and parched. They are meagre, ſulky, and perceptibly uglier than the other inhabitants of the ſame diſtrict, though they breathe the ſame

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air, live on the ſame aliments, and, in general, enjoy a ſuperior degree of fortune. Accordingly, they are far from being gentlemen both in name and in fact. Nay, there is a Nation bordering upon ours, the ſubjects of which are as much celebrated, all over Europe, for their pride as for their homelineſs. All thoſe men are rendered hard-favoured from the ſame cauſes that moſt of our children degenerate in look; who, however amiable in early life, become ugly on going to college, from the miſeries and irkſomeneſs of their inſtitutions. I ſay nothing of their natural character, which undergoes the ſame revolution with their phyſionomy; this laſt being always a conſequence of the other.

The ſame thing does not hold good reſpecting the nobleſſe of ſome other of our provincial diſtricts, and the nobility of other parts of Europe. Theſe, living, as they do, in good underſtanding among themſelves, and with their compatriots, are, in general, the handſomeſt men of their Nation, becauſe their ſocial and benevolent ſpirit is not in a ſtate of inceſſant conſtraint and anxiety.

To the ſame moral cauſes may be referred the beauty of the features of the Greek and Roman phyſionomies, where we generally meet with models ſo exquiſite, in their ſtatues and medallions. They were

were beautiful, becauſe they were happy; they lived in cordial union with their equals, and in the enjoyment of popular favour with the citizens at large. Beſides, there were among them no melancholy, moping, monkiſh inſtitutions, ſimilar to thoſe of our colleges, to disfigure the whole youth of a Nation at once. The deſcendants of thoſe ſame Nations are, at this day, far from exhibiting a reſemblance to their anceſtors, though the climate of their country is not in the ſmalleſt degree changed.

It is, farther, to moral cauſes that we muſt refer the ſingularly dignified phyſionomies of the great Lords of the Court of *Louis* XIV. as is viſible in their portraits. In general, perſons of quality being, by their rank, elevated above the reſt of the Nation, do not live continually at daggers drawing with each other, and with the other ſubjects of the State, as is the caſe of moſt of our ſmall country-gentlemen. Beſides, they are uſually educated under the paternal roof, that is, under the bleſſed influence of domeſtic enjoyment, and far remote from foreign jealouſy and ſtrife. But thoſe of the age of *Louis* XIV. had this diſtinguiſhed advantage over their poſterity, that they were taught to value themſelves on beneficence, and popular affability, and on beſtowing their patronage upon talents and virtue, wherever they found them.

them. There is not, perhaps, a great Family of that period, but what has the honour to boaſt of having brought forward, and raiſed into diſtinction, ſome one man of obſcure birth, or of the inferior nobility, who afterwards rendered himſelf illuſtrious, by means of ſuch ſupport, in arts, in literature, in the church, or in the army.

Theſe grandees acted thus, in imitation of the Sovereign, or, perhaps, from a remainder of the ſpirit of the magnificence of the feudal government, which then expired. Be this as it may, they were handſome, becauſe they were contented and happy; and this noble emotion of ſoul toward beneficence, has impreſſed on their phyſionomy a majeſtic character, which will ever diſtinguiſh them from the men of preceding ages, and ſtill more from that which has ſucceeded.

Obſervations of this kind are not an object of curioſity merely; they are of much more importance than is generally apprehended; for it follows, as a neceſſary conſequence, that, in order to form in a Nation beautiful children, and, of courſe, handſome men, in both the phyſical and moral ſenſe of the word, it is not neceſſary, according to the doctrine of certain medical men, to ſubject the human ſpecies to regular purgations, and under particular aſpects of the Moon. Children reſtricted

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to a rigid regimen of this ſort, as are moſt of thoſe of our Phyſicians and Apothecaries, all preſent wan paſteboard figures; and when grown up, pale complexions, and bilious temperaments, like their fathers.

In order to render children beautiful, you muſt render them phyſically, but above all, morally happy. You muſt prevent every poſſible occaſion of vexation to them, not by kindling in their breaſts dangerous and headſtrong paſſions, as in the caſe of ſpoiled children, but, on the contrary, by teaching them to curb ſuch as they have from Nature, and which ſociety is ever exciting into a ſtate of fermentation; and eſpecially, by carefully guarding againſt the communication of every thing unnatural, ſuch as uſeleſs and irkſome taſks, emulations, rivalſhips, and the like.....But we ſhall reſume this important ſubject, at greater length, hereafter.

The uglineſs of a child is to be imputed, in almoſt every caſe, to his nurſe, or to his preceptor. I have ſometimes obſerved, among ſo many claſſes of ſociety, more or leſs disfigured by our inſtitutions, ſome families ſingularly beautiful. On enquiring into the cauſe of this, I have found that thoſe families, though of the commonalty, were happier, in a moral reſpect, than thoſe of other citizens;

citizens; that the mothers had ſuckled their own children; that the young people had learned their occupations under the paternal roof and inſpection; that they had been treated with much tenderneſs and indulgence; that their parents were fondly attached to each other; and that they all lived together, notwithſtanding the hardſhips of their low condition, in a ſtate of liberty and cordiality, which rendered them good, happy, and ſatisfied.

I have thence deduced this other conſequence: That we frequently make a falſe eſtimate of the happineſs of human life. On ſeeing here a Gardener, with the port of a Roman Emperor; and there a great Lord, with the maſk of a ſlave, I imagined, at firſt, that Nature had committed a miſtake. But experience demonſtrates, that the great Lord in queſtion is, from the hour of his birth to that of his death, placed in a ſeries of poſitions, which permit him not to gratify his own inclination three times a year. For he is under the neceſſity, from his infancy upward, to do the will, firſt of his preceptors and maſters; in more advanced life, that of his prince, of miniſters of ſtate, of his rivals, nay, frequently, that of his enemies. Thus, he finds fetters innumerable in his very dignities. Our Gardener, on the other hand, paſſes his whole life without being expoſed to the

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ſlighteſt contradiction. Like the Centurion, in the Goſpel, he ſays to his ſervant, Come, and he cometh; and to another, Do this, and he doeth it. This demonſtrates, that Providence has aſſigned to our very paſſions a part widely different from that which ſociety preſents to them; for, in caſes innumerable, the moſt unrelenting ſlavery is impoſed, together with an accumulation of honours; and, in the meaneſt of human conditions, we frequently find the poſſeſſion of the moſt unbounded empire.

Beſides, perſons who have been disfigured, by the corruptive impreſſion of vicious education and habits, have it in their power to reform their looks; and I ſay this, principally, for the ſake of our females, who, in order to gain this point, apply white and red, and patch up faces, like thoſe of dolls, utterly deſtitute of character. After all, they are in the right; for it is much better to conceal character altogether, than to exhibit that of the cruel paſſions which are often preying upon them; eſpecially to the eyes of ſo many of the other ſex, who ſtudy character, merely to take the advantage of it. There are infallible means in their power of acquiring a beauty altogether irreſiſtible. It is to be internally good, gentle, compaſſionate, ſenſible, beneficent, and devout. Theſe affections of a virtuous ſoul will impreſs on their features characters

characters altogether celestial, which will appear beautiful, even to the farthest extremity of old age.

Nay, I will venture so far as to affirm, that the harsher the traits may be in homely persons, who have suffered degradation from a faulty education, the more sublime and impressive will be the contrasts produced in them by those which they acquire from habits of virtue; for, when we find goodness under an unpromising exterior, we are as agreeably surprized as at finding violets and primroses under a shrubbery of briars and thorns. Such was the sensation inspired, on a first introduction to the crabbed-looking M. *de Turenne*; and such, in our days, is that which we feel at the first aspect of a certain northern Prince, as justly celebrated for his goodness, as the King, his brother, has rendered himself by his victories. I have no doubt, that the repelling outside of these two great men, may have greatly contributed to give a peculiar prominency to the excellence of their heart. Such, too, was the beauty of *Socrates*, who, with the features of a profligate, delighted every eye, while he discoursed of virtue.

But to no purpose will a man attempt to decorate his countenance with the indications of good qualities, to which his heart is a stranger. This false beauty produces an effect still more disgusting than

than the moſt decided uglineſs; for when, attracted by an apparent goodneſs, we actually find diſhoneſty and perfidy, we are ſeized with horror, as when we find a ſerpent lurking in a bed of flowers. Such is the deteſtable character generally aſcribed to courtiers.

Moral beauty, then, is that after which we are bound to aſpire, that it's divine irradiations may be diffuſed over our features, and over our actions. To no purpoſe will a Prince himſelf make his boaſt of high birth, riches, credit, wit; the People, in order to know him, muſt look him in the face. The People form their judgment of him entirely from the phyſionomy: it is, in every country, the firſt, and, frequently, the laſt letter of recommendation.

OF CONCERTS.

Concert is an order formed of ſeveral harmonies of various kinds. It differs from ſimple order in this, that the laſt is, frequently, nothing but a ſeries of harmonies of the ſame ſpecies.

Every particular Work of Nature preſents, in different kinds, harmonies, conſonances, contraſts; and forms a real concert. This we ſhall more

amply unfold in the Study which treats of plants. It may henceforward be confidered as a well-founded remark, on the fubject of thofe harmonies, and of thofe contrafts, that vegetables, whofe flowers have the leaft luftre, are frequented by animals of the moft brilliant colours; and, on the contrary, that the vegetables which are moft highly coloured, ferve as an afylum to the dufkieft animals. This is particularly evident in countries fituated between the Tropics; where the trees and herbage, which have few, if any, apparent flowers, lodge and fupport birds, infects, nay monkies, of the moft lively colours. It is in the plains of India that the peacock difplays his gaudy plumage, on fhrubbery defpoiled of verdure by the burning heat of the Sun. In the fame climates it is, that the parrot race, confifting of fo many different fpecies, enamelled with a thoufand various colours, perch on the gray boughs of the palm-tree, and that clouds of little paroquets, green as the emerald, alight on fields embrowned by the lengthened heats of Summer.

In our temperate regions, on the contrary, moft of our birds are dull-coloured, becaufe moft of our vegetables have flowers and fruits with fhining colours. It is very remarkable, that fuch of our birds and infects as have lively colours ufually choofe, for their habitation, vegetables that have

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no apparent flowers. Thus, the heath-cock glifters on the gray verdure of the pine, whofe apples ferve him for food. The goldfinch builds his neft in the rough fullers-thiftle. The moft beautiful of our caterpillars, which is marbled with fcarlet, is to be found on a fpecies of the tithymal, that ufually grows in the fands, and amidft the quarries of the foreft of Fontainbleau. On the contrary, our birds of dufky hue inhabit fhrubbery with gay-coloured flowers. The black-headed bullfinch builds his neft in the white-thorn, and that lovely bird exhibits a farther moft agreeable confonance and contraft with the prickly fhrub where he refides, by his blood-ftained breaft, and the fweetnefs of his fong. The nightingale, with brown plumage, delights to neftle in the rofe-bufh, according to the traditions of the oriental Poets, who have founded many a charming fable on the loves of that melancholy bird for the rofe.

I could here exhibit a multitude of other harmonies, of a fimilar nature, refpecting the animals both of our own, and of foreign countries. I have collected thefe to a very confiderable number; but, I acknowledge, they are too incomplete to admit of my forming of them the entire concert of one plant. I fhall, however, treat the fubject more at large, under the article of vegetables. It

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will be ſufficient, at preſent, to produce a ſingle example, which inconteſtably proves the exiſtence of thoſe harmonic Laws of Nature: it is this, that they ſubſiſt even in places not expoſed to the view of the Sun. We always find, in the cells of the mole, fragments of the bulbous root of the colchica, cloſe by the neſt of her young. Now, let any one examine all the plants which uſually grow in our meadows, and he will find none which forms more harmonies and contraſts with the black colour of the mole, than the white, impurpled, and lilach-coloured flowers of the colchica. This plant, likewiſe, furniſhes powerful means of defence to the feeble mole againſt her natural enemy, the dog, who is continually hunting after her in the meadows; for he is poiſoned if he eats it. For this reaſon, the colchica has obtained the trivial name of dog-bane. The mole, then, finds a ſupply of food for her neceſſities, and a protection againſt her enemies, in the colchica, as the bullfinch does in the white thorn. Such harmonies are not only very agreeable objects of ſpeculation, but may be turned to very good practical account; for, from what has juſt been ſuggeſted, it will follow, that if you wiſh to allure the bullfinch to your ſhrubbery, you have only to plant the white thorn; and if you would clear your grounds of the mole, exterminate the bulbs of the colchica.

If to each plant are added it's elementary harmonies, ſuch as thoſe of the ſeaſon when it appears; of the ſoil and ſituation in which it vegetates; the effects of the dews, and of the reflexes of the light on it's foliage; the movements which it undergoes from the action of the winds; it's contraſts and conſonances with other plants, and with the quadrupeds, the birds, and the inſects, which are peculiar to it; and you will perceive a delightful concert formed all around, the harmonies of which are ſtill unknown to us. It is only, however, by purſuing this track, that we ſhall be enabled to obtain a glimpſe of the immenſe and magnificent edifice of Nature. I would earneſtly intreat Naturaliſts, perſons fond of gardening, Painters, nay, Poets likewiſe, thus to proſecute their ſtudies, and to make frequent draughts from this perennial ſpring of taſte and of delight. They will behold new worlds ariſing into view, and, without removing from their own Horizon, they will make diſcoveries infinitely more curious than thoſe which are contained in our books and cabinets, where the productions of the Univerſe are frittered away, and disjoined, in the petty drawers of our mechanical ſyſtems.

I know not, at preſent, what name I ought to give to the conformities which thoſe particular concerts have with Man. Certain it undoubtedly

is, that there is no Work of Nature but what ſtrengthens it's particular concert, or, if you will, it's natural character, by the habitation of Man; and which does not communicate, in it's turn, to the habitation of Man, ſome expreſſion of grandeur, of gaiety, of terror, or of majeſty. There is no verdant mead but what is rendered more cheerful by a dance of ſhepherdeſſes and their ſwains; and no tempeſt but what acquires additional horror from the ſhipwreck of a veſſel. Nature raiſes the phyſical character of her Works to a ſublime moral character, by collecting them around mankind. This is not the place to deſcant at large on the new order of ſentiments hereby ſuggeſted. I ſatisfy myſelf, at preſent, with obſerving, that ſhe not only employs particular concerts to expreſs, in detail, the characters of her Works; but when ſhe means to expreſs theſe ſame characters on the great ſcale, ſhe combines a multitude of harmonies and of contraſts of the ſame kind, in order to form of them one great general concert, which has only a ſingle expreſſion, let the field of repreſentation be ever ſo extenſive.

Thus, for example, in order to expreſs the maleficent character of a venemous plant, ſhe combines in it claſhing oppoſitions of the forms and colours which are the indications of that maleficence; ſuch as retreating and briſtly forms, livid colours,

colours, dark greens, with white and black ſpots, virulent ſmells....But when ſhe means to characterize a whole diſtrict that is unwholeſome, ſhe collects a multitude of ſimilar diſſonances. The air is loaded with thick fogs, the turbid waters exhale only nauſeous ſmells, no vegetable thrives on the putrid ſoil but ſuch as are diſguſting, the dracunculus, for inſtance, the flower of which exhibits the form, the colour, and the ſmell of an ulcer. If any tree ariſes in the cloudy atmoſphere, it is the yew only, whoſe red and ſmoky trunk has the appearance of having paſſed through the fire, and whoſe gloomy foliage ſerves as an aſylum only to owls. If any other animal is to be found ſeeking a retreat under it's lurid ſhade, it is the blood-coloured centipede, or the toad crawling along the humid and rotten ground. By theſe, or ſimilar ſigns, Nature ſcares Man away from noxious ſituations.

If ſhe intends to give him, at ſea, the ſignal of an impending tempeſt; as ſhe has oppoſed, in ferocious animals, the fiery glare of the eyes to the thickneſs of the eye-brows; the ſtripes and ſpots with which they are marked to the yellow colour of their ſkin, and the ſtillneſs of their movements to the thundering noiſe of their voices; ſhe collects, in like manner, in the ſky, and on the deep, a multitude of claſhing oppoſitions, which, in concert, announce approaching devaſtation.

Dark

Dark clouds ſweep through the air in the horrible forms of dragons. Here and there the pale fire of lightning burſts from the gloom, the noiſe of the thunder, with which their dark womb is impregnated, reſounds like the roaring of the celeſtial lion. The Orb of Day, who can ſcarcely render himſelf viſible through their rainy and multiplied veils, emits long radiations of a wan and ſickly light. The leaden ſurface of the Ocean ſinks and ſwells into broad white foaming ſurges. A hollow murmuring noiſe ſeems to iſſue from thoſe threatening billows. The black ſhallows whiten at a diſtance, with horrid ſounds, from time to time, interrupted by ominous ſilence. The Sea, which alternately covers and reveals them, diſplays to the light of day their cavernous foundations. The Norwegian lom perches on one of their craggy points, uttering lamentable cries, like thoſe of a drowning man. The ſea-oſpray riſes aloft in the air, and not daring to commit herſelf to the impetuoſity of the winds, ſtruggles, with a plaintive ſcreaming voice, againſt the tempeſt, which bends back her ſtubborn wings. The black procellaria flutters about, grazing the foam of the waves, and ſeeks, in the cavity of their moving valleys, a ſhelter from the fury of the winds. If this ſmall and feeble bird happens to perceive a ſhip in the midſt of the Sea, he flees for refuge along her ſide, and, as a reward for the protection which he ſolicits, announces

announces the tempeſt to the mariner before it overtakes him.

Nature uniformly proportions the ſigns of deſtruction to the magnitude of the danger. Thus, for example, the ſigns of tempeſt off the Cape of Good-Hope far exceed thoſe on our coaſts. The celebrated *Vernet*, who has exhibited ſo many terrifying repreſentations of the Sea, is far from having depicted all the horrors of the watery element. Every ſtorm has it's peculiar character, in every particular latitude. Far different are the ſtorms off the Cape of Good-Hope, from thoſe off Cape Horn; thoſe of the Baltic from thoſe of the Mediterranean; thoſe on the banks of Newfoundland from thoſe on the coaſt of Africa. They farther differ, according to the ſeaſon of the year, and even according to the hour of the day. Thoſe of Summer are very unlike thoſe of Winter; and widely different is the ſpectacle of an enraged ſea, ſhining at noon-day under the rays of the Sun, and that of the ſame ſea illuminated, at the midnight hour, by a ſingle flaſh of lightning. But you perceive, in all, the claſhing oppoſitions of which I have made mention.

I have remarked one thing, in the tempeſts off the Cape of Good-Hope, which ſtrikingly ſupports all that I have hitherto advanced, reſpecting the

the principles of diſcord and harmony; and which may, perhaps, ſuggeſt profound and uſeful reflection to ſome one of greater ability than I can pretend to. It is this, That Nature frequently accompanies the ſigns of the diſorder which agitates the Ocean, with agreeable expreſſions of harmony, that ſerve only to redouble the horror of the ſcene.

Thus, for example, in two different ſtorms to which I was expoſed in thoſe ſeas, I did not ſee the face of Heaven obſcured by dark clouds, nor theſe clouds furrowed by alternate flaſhes of lightning, nor a ſea muddy and lead-coloured, as in the tempeſts of our climates. The ſky, on the contrary, preſented a fine blue, and the ſea a beautiful azure; there were no other clouds hovering in the air, but ſmall aggregations of a ruddy vapor, dark toward the centre, and illuminated, about the extremities, with the yellow luſtre of burniſhed braſs. They took their departure from a ſingle point in the Horizon, and travelled acroſs the Heavens with the rapidity of a bird flying. When the thunder ſhivered in pieces our main-maſt, in the middle of the night, it did not roll; and emitted only a crack reſembling that of a cannon, ſhot off cloſe by us. Two other thunder-claps, which had preceded this one, were exactly ſimilar. This was in the month of June, which is mid-winter at the Cape of Good-Hope.

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I was caught in another ſtorm, when doubling the Cape, on my return, in the month of January, which is mid-ſummer in that part of the world. The ground of the Heavens was blue, as in the firſt, and not above five or ſix clouds were perceptible above the Horizon; but each of them, white, black, cavernous, and of an enormous magnitude, reſembled a portion of the Alps ſuſpended in the air. This laſt was much leſs violent than the former, with it's ſmall ruddy vapours. In both, the ſea was of the ſame beautiful azure colour with the ſky; and, on the curling creſts of the vaſt billows, ruſhing like ſo many caſcades, were formed bright coloured rainbows.

Theſe tempeſts, in the full blaze of light, are inexpreſſibly tremendous. The ſoul ſtands aghaſt at ſight of the indications of tranquillity converted into ſigns of ſtorm; the unclouded azure in the Heavens, and the rainbow playing upon the waves. The principles of harmony appeared to be completely inverted. Nature ſeemed to have put on a character of perfidiouſneſs, and to conceal fury under the maſk of benevolence.

The ſhallows of thoſe Latitudes exhibit ſimilar contraſts. *John-Hugo de Linſchotten*, who ſaw thoſe of the Jeweſs, at no great diſtance, in the Moſambique channel, and upon which he was in extreme danger

danger of making ſhipwreck, informs us, that they have a moſt hideous aſpect, being black, white, and green. Thus Nature increaſes the characters of terror, by intermingling with them certain agreeable expreſſions.

There is a farther obſervation, of eſſential importance, to be made in this place; namely, that in thoſe awful ſcenes of danger and affright, the terrible is cloſe upon you, and the agreeable is removed to an immenſe diſtance; tumult is in the ſeas, and ſerenity in the ſky. A prodigious extenſion is thus given to the ſentiment of diſorder; for there is no apparent boundary ſet to tempeſts of this ſort. All depends on the firſt impulſion which we undergo. The ſentiment of infinity that is within us, and which is ever making new efforts to propagate itſelf farther and farther, ſeeks to make it's eſcape from the phyſical evil wherewith it is ſurrounded; but repelled, in ſome ſort, by the ſerenity of the treacherous Horizon, falls back upon itſelf, and undergoes a ſeverer pang, under the preſſure of preſent painful affections, becauſe their ſource has the appearance of being invariable.

Such is the Giant of Storms, ſtationed by Nature at the entrance of the Seas of India, and ſo well delineated by the pencil of *Camoëns*. Nature,

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in our climates, produces quite contrary effects, for, during Winter, ſhe redoubles our repoſe within doors, by covering the face of Heaven with dark and rainy clouds. All depends, as I have juſt ſaid, on the firſt impulſion which the ſoul receives. *Lucretius* is, undoubtedly, right in ſaying, that our pleaſure and ſecurity, on ſhore, are greatly increaſed by the ſight of a ſtorm at ſea.

A Painter, accordingly, who wiſhed to ſtrengthen, in a picture, the effect of a beautiful landſcape, and the felicity of it's inhabitants, would only have to repreſent, in the back-ground, a veſſel at the mercy of the winds, and of the raging deep: the happineſs of the ſhepherds would, in this caſe, be powerfully heightened by contraſt with the diſtreſs of the mariners. But if it were his intention, on the contrary, to augment the horrors of a tempeſt, it would be neceſſary for him to place, in oppoſition to the diſtreſs of the mariners, the felicity of the ſhepherds; and, for this effect, the veſſel muſt be introduced between the ſpectator and the landſcape. The firſt ſentiment depends on the firſt impulſion; and the ground contraſting with the ſcene, is ſo far from being a deviation from Nature, that the leading object is impreſſed with additional energy, by being thrown back upon itſelf. Thus, it is poſſible, with the ſame objects

placed

placed differently, to produce directly oppoſite effects.

If Nature, by introducing certain agreeable harmonies into ſcenes of diſcord, redoubles their confuſion, ſuch as the green colour of the rocks of the Jeweſs, or the azure, in the tempeſts off the Cape, ſhe frequently throws in a diſcordance, in concerts the moſt delightful, for the purpoſe of heightening the pleaſurable effect. Thus, a noiſy water-fall precipitating itſelf into a tranquil valley; or a rugged and duſky rock aſcending in the midſt of a verdant plain, enhances the beauty of a landſcape. Thus a mole on a beautiful face gives it additional vivacity. Skilful Artiſts have ſometimes happily imitated thoſe harmonic contraſts. *Callot*, when he intended to aggravate the horror of his infernal ſcenery, introduced, amidſt his demons, the head of a fine woman on the carcaſe of an animal. On the contrary, the moſt renowned Grecian Painters, in order to render *Venus* more intereſting, repreſented her with a ſlight ſquint in her eyes.

Nature employs offenſive contraſts only for the purpoſe of chaſing Man away from ſome perilous ſituation. In all the reſt of her Works, ſhe employs only harmonic mediums. I muſt not involve myſelf

myſelf in the examination of their different concerts; it is a ſubject whoſe riches are inexhauſtible. All that could be expected from my ſcanty fund was the indication of a few of their principles. I ſhall endeavour, however, to trace a ſlight ſketch of the manner in which ſhe harmonizes the common fields of our harveſts, theſe, being the production of human agriculture, ſeem abandoned to the monotony that characterizes moſt of the Works of Man.

Firſt of all, it is remarkable, that we here find that charming ſhade of green, produced by the alliance of the two primordial oppoſite colours, which are the yellow and the blue. This harmonic colour decompounds itſelf, in it's turn, by another metamorphoſis, toward the time of the harveſt, into the three primordial colours, namely, the yellow of the ripening corn, the red of the wild poppy, and the azure of the blue-bottle. Theſe two plants are found intermingled with the ſtanding corn, all over Europe, let the farmer take what pains he may in ſifting the grain, and weeding his field. They form, by their harmony, a very rich purple tint, which riſes admirably on the yellow ground of the corn-field.

If you ſtudy theſe two plants ſeparately, you will find between them a variety of particular

contrasts; for the blue-bottle has narrow and slender leaves; but those of the poppy are broad, with deep incisions. The blue-bottle has the corolla of it's flowers radiating, and of a delicate azure; but those of the poppy are large, and of a deep red. The blue-bottle throws out divergent stalks; but those of the poppy are straight. We find, besides, among the corn, the cockle, or corn-rose, which rises to the height of the expanded ear, with handsome purple flowers, in form of a trumpet; and the convolvulus, with a flesh-coloured flower, crawling up along the reeds, and surrounding them with verdure, like a thyrsus. There is a great variety of other vegetables usually to be found growing among corn, and forming contrasts the most agreeable, most of them exhale the sweetest perfumes; and, when agitated by the Summer's breeze, you would be disposed, from their undulations, to imagine the whole a sea of verdure enamelled with flowers. Add to all the rest a gentle rustling of the ears against each other, most agreeably soothing, which, by it's soft murmuring sound, invites to sleep.

These lovely forests of vegetable beauty are not destitute of inhabitants. You see bustling about under their shade, the green-coated scarab, streaked with gold, and the monoceros, of the colour of burnt coffee. This last insect takes delight in a hillock

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of horſe-dung, and is furniſhed with a ploughſhare on his head, with which he removes the ground like a labourer. There are, beſides, a variety of charming contraſts in the bees and the butterflies, which are attracted by the flowers of the corn-field, and in the manners of the birds which inhabit them. The far-travelled ſwallow is continually ſkimming along their ſurface, undulating like the waters of a lake; whereas the ſtationary lark towers above them, in a perpendicular direction, within ſight of her neſt. The domeſticated partridge, and tranſitory quail, there find a ſituation equally favourable to both, for rearing their young. The hare frequently burrows in their neighbourhood, and quietly nibbles the wild-thiſtle.

Theſe animals have, with Man, relations of utility, from their fruitfulneſs and their furs. It is remarkable, that they are to be found over all the corn-diſtricts of Europe, and that their ſpecies are varied, according to all the variety of human habitation; for there are different ſpecies of quails, partridges, larks, ſwallows, and hares, adapted to the plains, to the mountains, to the heaths, to the meadows, to the foreſts, and to the rocks.

As to the corn-plant itſelf, it has relations innumerable with the wants of Man, and of his do-

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meſtic animals. It is neither too high nor too low for his ſtature. It is eaſily handled and reaped. It furniſhes grain to his poultry, bran to his pigs, forage and litter to his black cattle and his horſes. Every plant that grows in his corn-field poſſeſſes virtues particularly adapted to the maladies incident to the condition of the labouring-man. The poppy is a cure for the pleuriſy; it procures ſleep; it ſtops hemorrhages and ſpitting of blood. The blue-bottle is a diuretic; it is vulnerary, cordial, and cooling; it is an antidote to the ſtings of venemous inſects, and a remedy for inflammation of the eyes. Thus the huſbandman finds all needful pharmacy, in the field which he cultivates.

The culture of this ſtaff of life diſcloſes to him many other agreeable concerts with his fleeting exiſtence. The direction of it's ſhadow informs him of the hour of the day; from it's progreſſive growth he learns the rapid flight of the ſeaſons: he reckons the flux of his own fugitive years, by the ſucceſſions of the guiltleſs harveſts which he has reaped. He is haunted with no apprehenſion, like the inhabitants of great cities, of conjugal infidelity, or of a too numerous poſterity. His labours are always ſurpaſſed by the benefits of Nature. When the Sun gets to the ſign of Virgo, he ſummons his kindred, he invites his neighbours, and marches at their head, by the dawning of

of the day, with ſickle in hand, to the ripened field. His heart exults with joy as he binds up the ſwelling ſheaves, while his children dance around them, crowned with garlands of blue-bottles and wild poppies. Their harmleſs play recalls to his memory the amuſements of his own early days, and of his virtuous anceſtors, whom he hopes, at length to rejoin in a better and happier World. The ſight of his copious harveſt demonſtrates to him that there is a GOD; and every return of that joyous ſeaſon, bringing to his recollection the delicious eras of his paſt exiſtence, inſpire him with gratitude to the Great Being who has united the tranſient ſociety of men, by an eternal chain of bleſſings.

Ye flowery meadows, ye majeſtic, murmuring foreſts, ye moſſy fountains, ye deſert rocks, frequented by the dove alone, ye enchanting ſolitudes, which charm by your ineffable concerts; happy is the man who ſhall be permitted to unveil your hidden beauties! but ſtill happier far is he who ſhall have it in his power calmly to enjoy them in the inheritance of his forefathers!

OF SOME OTHER LAWS OF NATURE, HITHERTO IMPERFECTLY KNOWN.

There are, befides thofe which have been mentioned, fome phyfical Laws, not hitherto profoundly inveftigated, though we have had a glimmering of them, and made them the frequent fubject of converfation. Such is the Law of attraction. It has been acknowledged in the planets, and in fome metals, as in iron and the load-ftone, in gold and mercury. I believe attraction to be common to all metals, and even to all foffils; but that it acts, in each of them, in particular circumftances, which have not hitherto been obferved, and afcertained. Each of the metals, perhaps, may have a difpofition to turn toward different points of the Earth, as magnetic iron points toward the North, and toward places where there are mines of iron. It would probably be neceffary, in order to afcertain this by experiment, that each metal fhould be armed with it's proper attraction; this takes place, as I think, when it is united to it's contrary.

How do we know, whether a needle of gold, rubbed with mercury, might not have attractive poles, as a needle of fteel has, when rubbed with the

the magnet? Thus prepared, or in ſome other way adapted to it's nature, it might poſſibly indicate the places which contain mines of that rich metal. Perhaps it might determine the general points of direction to the Eaſt or to the Weſt, which might ſerve as an indication of the Longitudes, more ſteadily than the variations of the magnetic needle.

If there be a point at the Pole, on which the Globe ſeems to revolve, there may, poſſibly, be one under the Equator, from which it's rotatory motion has commenced, and which may have determined it's motion of rotation. It is very remarkable, for example, that all ſeas are filled with univalve ſhell-fiſh, of an infinity of very different ſpecies, which all have their ſurrounding ſpirals, in an increaſing progreſſion, and in one and the ſame direction, that is, from left to right, like the motion of the Globe, when the mouth of the ſhell is turned northward, with the baſe to the ground. There is only a very ſmall number of ſpecies which may be conſidered as exceptions, and which have, for this very reaſon, been denominated *unique* (ſingular, or extraordinary). The ſpirals of theſe circulate from right to left.

A direction ſo general, and exceptions ſo particular in univalve ſhell-fiſh, undoubtedly have

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their caufes in Nature, and their epochas, in the unknown ages when their germs were created. It is impoffible that they fhould proceed from the actual influence of the Sun, who acts on them in a thoufand different afpects. Can they have been thus directed in a conformity to fome general Current of the Ocean, or to fome unknown attraction of the Earth, toward the North or the South, toward the Eaft or the Weft? Thefe relations will appear ftrange, and perhaps frivolous, to our men of Science; but every thing in Nature is a feries of concatenation. A flight obfervation here, in many cafes, leads to important difcovery. A fmall plate of iron turning toward the North, guides a whole Navy through the deferts of the Ocean; and a reed of an unknown fpecies, thrown on the coaft of the Azores, fuggefted to *Chriftopher Columbus* the exiftence of a weftern World.

Whatever may be in this, certain it is, that there exifts a great number of thofe particular points of attraction, fcattered over the Earth, fuch as the matrices which renovate the mines of metals, by attracting to themfelves the metallic parts difperfed in the elements. It is by means of attractive matrices, that thofe mines are inexhauftible, as has been remarked in many places, among others, in the Ifle of Elba, fituated in the Mediterranean. This little ifland is entirely a mine

mine of iron, from which had been already extracted, in the time of *Pliny*, an immenſe quantity of that metal, without it's being perceptible, as he tells us, that it was in the ſmalleſt degree diminiſhed. Metals have, beſides, other attractions; and if I might preſume to deliver my opinion by the way, I conſider theſe themſelves as the principal matrices of all foſſil bodies, and as the ever active means employed by Nature for repairing the mountains and the rocks, which the action of the other elements, but, eſpecially, the injudicious labours of men, have an inceſſant tendency to impair.

I ſhall here remark, on the ſubject of mines of gold, that they are placed, as well as thoſe of all metals, not only on the moſt elevated part of Continents, but in icy mountains.

The celebrated gold mines of Peru, and of Chili, are, it is well known, in the Cordeliers. The gold mines of Mexico are ſituated in the vicinity of Mount St. Martha, which is covered with ſnow all the year round. The rivers of Europe, which waſh down particles of gold along their ſhores, iſſue from icy mountains. The Po, in Italy, has it's ſource in thoſe of Piedmont. But without quitting France, we reckon ten greater or ſmaller rivers, which roll along gold-duſt, intermingled

mingled with their ſands, and which have all of them their origin in mountains of ice. Such is the Rhine, from Straſburg to Philipſburg; the Rhone, in the Païs de Gex; the Doux, in Franche-Comté, which three all take their riſe in the icy mountains of Switzerland. The Ceſe and the Gardon deſcend from thoſe of the Cevennes. The Ariege, in the Païs de Foix; the Garonne, in the vicinity of Tholouſe; the Salat, in the County de Conſerans; and the rivulets of Ferriet and Benagues, all take their riſe in the icy moun- of the Pyrennées.

This obſervation may be extended, I believe, to all the gold mines in the World, even to thoſe of Africa, ſuch of whoſe rivers as waſh down the greateſt quantities of gold-duſt, the Senegal, for inſtance, deſcend from the mountains of the Moon.

To this it may be objected, that gold was formerly found in Europe, in places where there there were no icy mountains; nay, that ſome has been picked up on the ſurface of the ground, as in Braſil; and not many years ago, that there was found an ingot, or maſs, of ſeveral pounds weight, on the bank of a river in the diſtrict of Cinaloa, in New-Mexico. But, if I might venture to hazard a conjecture, reſpecting the origin of this gold,

gold, ſcattered about on the ſurface of the earth, in the ancient Continent of Europe, and eſpecially in that of the New-World; I believe it to have proceeded from the total effuſions of the ices of the mountains, which took place at the time of the Deluge; and that, as the ſpoils of the Ocean covered the weſtern parts of Europe, that thoſe of vegetable earths were ſpread over the eaſtern part of Aſia, thoſe of minerals, from the mountains, were forced along other countries, where their fragments were found, in the earlier ages, in grains, and even in larger maſſes.

This much is certain, that when *Chriſtopher Columbus* diſcovered the Lucayo and Antilles iſlands, he found among thoſe iſlanders abundance of gold of a baſe alloy, the produce of the traffick which they carried on with the inhabitants of the Continent; but they had no mines within their own territory, notwithſtanding the prejudice then entertained, and under which many labour to this day, that the Sun formed this precious metal in the earth of the Torrid Zone. For my own part, I find, as I have juſt obſerved, gold much more common in the vicinity of icy mountains, whatever their Latitude may be; and I conjecture, from analogy, that there muſt be very rich mines of it in the North. It is extremely probable, that the waters of the Deluge hurled along conſiderable

ſiderable portions of that metal to the northern countries.

We read, I think, in the Book of Job, the Arabian, this remarkable expreſſion ; " Gold cometh " from the North." * Certain it is, that the firſt commerce of India with Europe was carried on by the North, as has been clearly demonſtrated by the Baron *de Stralenberg*, a Swediſh exile, after the battle of Pultowa, in Siberia, of which he has given a very intelligent and accurate deſcription. He ſays, that it is ſtill poſſible to purſue, by evident traces, the track of the ancient Indians along the river of Petzora, which empties itſelf into the White Sea. On it's banks, in various places, are found many of their tombs, which contain, ſome of them, manuſcripts on ſilk ſtuffs, in the language of *Thibet* ; and there are perceptible, on the rocks along it's ſhores, characters which they

* This is not entirely of a piece with our Author's uſual accuracy. It is written, indeed, in the Book of Job, chap. xxxvii. ver. 9. " *Cold* cometh out of the North ;" and ver. 22. " *Fair* " *weather* cometh out of the North :" but no where in Scripture, ſo far as I know, is this affirmed of *Gold*. *St. Pierre* ſeems to have quoted from general and indiſtinct recollection ; happy, no doubt, to have, as he thought, a text from the Bible to ſupport his conjecture. But, notwithſtanding this defect, his reaſoning is plauſible, and the human teſtimony which he adduces reſpectable. H. H.

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have traced upon them, in a red which cannot be effaced. From this river they forced their way through the lakes, by means of leathern boats, to the Baltic; or coafted along the northern and weftern fhores of Europe.

This track was known to the Indians, even from the time of the ancient Romans; for *Cornelius Nepos* relates, that a King of the Suevi made a prefent to *Metellus Celer* of two Indians, who had been thrown, by ftrefs of weather, with their leathern canoe, on the coafts adjacent to the mouth of the Elbe. It is not eafy to conceive what thofe Indians, the inhabitants of a warm country, were going in queft of, fo far to the North. What ufe could they have made, in India, of the furs of Siberia? It would appear they went thither in fearch of gold, which might then be frequently difcoverable to the North, at the furface of the earth.

Whatever may be in this, it is prefumable that, as mines of gold are placed in the moft elevated regions of the Continent, their matrices collect, in the Atmofphere, the volatilized particles of gold, which afcend thither with the foffil and aquatic emanations, conveyed by the winds from every quarter. But they exercife over men, attractions ftill much more powerful.

It would appear as if Nature, by burying the focuſes of this rich metal under the ſnows, had intended to fence it with ramparts ſtill more inacceſſible than the flinty boſom of the rock, leſt the undiſmayed ardor of human avarice ſhould, at length, deſtroy them entirely. It has become the moſt powerful bond of ſociety, and the perpetual object of all the labours of a life ſo rapidly hurrying to a cloſe. Alas! were Nature, at this day, to inflict condign puniſhment on this inſatiable thirſt in the Nations of Europe, for a metal ſo uſeleſs, as a real neceſſary of human life, ſhe has only to change the territory of ſome one of them into gold. Every other Nation would inſtantly flock thither, and, in a little time, exterminate it's wretched inhabitants. The Peruvians and Mexicans have had the dreadful experience of this.

There are metals not ſo highly prized, but much more uſeful, the elementary attractions of which might, perhaps, procure us very important accommodations.

The peaks of the mountains, and their lengthened creſts, are filled, as we have ſeen, with iron or copper, intermingled with a vitreous body, of granite, or of natural cryſtal, which attracts the rains and the ſtormy clouds, like ſo many real electric

electric needles. There is not a ſeaman but what has ſeen, a thouſand times, thoſe peaks, and thoſe creſts, covered with a cloudy cap, gathered round and round, and concealing them entirely from view, without once ſuſpecting the cauſe of this appearance. Our Philoſophers, on the other hand, deducing their concluſions merely from the inſpection of charts, have taken thoſe rocky protuberances for the wrecks of a primitive earth, without giving themſelves any trouble about their effects.

They ought to have obſerved, that thoſe metallic pyramids and creſts, as well as moſt mines of iron and copper, are always to be found in elevated ſituations, and at the ſource of all rivers, of which they are the primitive cauſes, by means of their attractions. Their general inattention to this ſubject is thus only to be accounted for; ſeamen obſerve, and do not reaſon; and the learned reaſon, but do not obſerve. Undoubtedly, had the experience of the one been united to the ſagacity of the other, prodigies of diſcovery might have been expected.

I am perſuaded that, in imitation of Nature, it might be poſſible for us to acquire the art of forming, by means of electric ſtones, artificial fountains, which ſhould attract the rainy clouds in

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parched and dry ſituations, as chains and rods of iron attract thunder-clouds. It is true, that Princes muſt be at the expenſe of ſuch coſtly and uſeful experiments; but it is the way for them to immortalize their memory. The *Pharoahs*, who built the pyramids of Egypt, would not have drawn upon themſelves the curſes of their ſubjects, as *Pliny* aſſures us they did, for their enormous and uſeleſs labours, had they reared, amidſt the ſands of Upper Egypt, an electrical pyramid, which might there have formed an artificial fountain. The Arab who ſhould reſort thither, at this day, to quench his thirſt, would ſtill pronounce benedictions on names which, if we may believe the great Natural Hiſtorian, had already ſunk into oblivion, and ceaſed to be mentioned, in his time.

For my own part, I think that ſeveral metals might be proper for producing ſimilar effects. An officer of high rank, in the ſervice of the King of Pruſſia, informed me that, having remarked vapours to be attracted by lead, he had employed it's attraction for drying the atmoſphere of a powder-magazine. This magazine was conſtructed under ground, in the throat of a baſtion, but had been rendered of no uſe whatever, from it's humidity. He ordered to line with a coat of lead the concave ceiling of the arch, which was before planked over,

over, where the gunpowder was depoſited in barrels: the vapors of the vault collected in great drops, on the leaden roof, run off in ſtreamlets along the ſides, and left the gunpowder barrels perfectly dry.

It is to be preſumed that every metal, and every foſſil, has it's peculiar repulſion as well as it's attraction; for theſe two Laws always go hand in hand. Contraries ſeek out each other.

There are, farther, a multitude of other harmonic Laws, as yet undiſcovered; ſuch are the proportions of magnitudes, and of the durations of exiſtence, in beings vegetative and ſenſible, which differ exceedingly, though their nutriment and climates may be the ſame. Man, while yet a youth, ſees the dog, his companion and contemporary, die of old age; and alſo the ſheep, which he fondled when a lamb. Though the former lived at his own table, and the other on the herbage of his meadow, neither the fidelity of the one, nor the temperance of the other, was able to prolong their days; whereas animals which live only on carrion and garbage, live for ages, as the crow. It is impoſſible to guide ourſelves in proſecuting ſuch reſearches, any other way than by following the ſpirit of conformity, which is the

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basis of our own reason, as it is that of the reason of Nature.

By consulting this, we shall find, that if such and such a carnivorous animal is long-lived, as the crow for instance, it is because his services and his experience are long necessary for purifying the earth, in places whose impurities are incessantly renewing, and which are frequently at great distances from each other. If, on the contrary, an innocent animal lives but a little while, it is because his flesh and his skin are necessary to Man. If the domestic dog, by his death, frequently diffuses sorrow over the children of the family, whose intimate friend and fellow-boarder he was, Nature, undoubtedly, intended to give them, in the loss of an animal so worthy of the affections and the regret of the heart of Man, the first experience of the privations with which human life is to be exercised.

The duration of an animal's life is sometimes proportioned to the duration of the vegetable on which it feeds. A multitude of caterpillars are born, and die with the leaves by which their transitory existence is supported. There are insects whose being is limited to five hours; such is the ephemera. This species of fly, about half as large

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as the tip of the little finger, is produced from a fluviatic grub, which is found particularly at the mouths of rivers, close by the water's edge, in the mud, into which it digs in queſt of ſubſiſtence. This grub lives three years, and at the termination of that period, about Midſummer-day, it is transformed, almoſt inſtantaneouſly, into a fly, which comes into the world at ſix o'clock in the evening, and dies about eleven at night. No longer ſpace of time is neceſſary for copulation, and for depoſiting the eggs on the mud which the water has deſerted.

It is very remarkable, that this inſect copulates, and lays her eggs, preciſely at the time of the year when the tides are at the loweſt, when the rivers diſcover, at the place of their diſcharge, the greateſt part of their channel dry. Wings are then furniſhed, to enable her to go and depoſit her eggs in places which the waters forſake, and to extend, in the capacity of a fly, the domain of her poſterity, at the time when, as a worm, her territory is moſt contracted. I have likewiſe remarked, in the microſcopic drawing and diſſections given of this inſect by the ingenious *Thevenot*, in the laſt parts of his collection, that in her fly ſtate, ſhe has neither interior nor exterior organs of nutrition. They would have been entirely uſeleſs to a life of ſuch tranſient duration.

Nature has made nothing in vain. It is not credible that ſhe ſhould have created momentary lives, and beings infinitely minute, to fill up imaginary chains of exiſtence. The Philoſophers who aſcribe to her theſe pretended plans of univerſality, which are deſtitute of every ſhadow of proof, and which make her deſcend into the infinitely ſmall, for purpoſes equally frivolous, would repreſent her as acting ſomewhat like a mother, who gives, as toys to amuſe her children, tiny coaches, and minute articles of houſehold furniture, of no uſe in the world, but which are imitations of domeſtic utenſils.

The averſions and the inſtincts of animals emanate from Laws of a ſuperior order, which we ſhall never be able to penetrate into in this world; but, ſuppoſing thoſe intimate conformities to elude our reſearches, they muſt be referred, like every other, to the general conformity of beings, and eſpecially to that of Man. There is nothing ſo luminous in the ſtudy of Nature, as to refer every thing that exiſts to the goodneſs of GOD, and to the demands of humanity. This method of viewing objects not only diſcovers to us a multitude of unknown laws, but it ſets bounds to thoſe which we do know, and which we believe to be univerſal.

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If Nature, for example, were governed by the Laws of attraction only, according to the suppofition of thofe who have made it the bafis of fo many fyftems, every thing in it would be in a ftate of reft. Bodies, tending toward one common centre, would there accumulate, and arrange themfelves round it, in the ratio of their gravity. The fubftances which compofe the Globe, would be fo much heavier as they approached nearer to the centre, and thofe which are at the furface, would all be reduced to a level. The bafon of the Seas would be choked with the wrecks of the Land; and this magnificent architecture, formed of harmonies fo various, would foon become an aquatic Globe entirely. All bodies hurled downward by one common precipitation, would be condemned to an everlafting immobility.

On the other hand, if the Law of projection, which is employed for explaining the motions of the heavenly bodies, on the fuppofition that they have a tendency to fly off in the tangent of the curve which they defcribe; if, I fay, this Law predominated, all bodies, not actually adherent to the Earth, would be hurled from it, like ftones from a fling: our Globe itfelf, fubjected to this Law, would fly off from the Sun never to return. It

would ſometimes traverſe, in it's unbounded career, the ſpaces of immenſity, where no ſtar would be perceptible during the courſe of many ages; ſometimes, ſwinging through regions where chance might have collected the matrices of Creation, it might paſs along amidſt the elementary parts of Suns, aggregated by the central Laws of attraction, or ſcattered about in ſparks and in rays, by thoſe of projection.

But, on the ſuppoſition that theſe two contrary forces were combined happily enough in favour of the Globe, to fix it, with it's vortex, in a corner of the firmament, where theſe forces ſhould act without deſtroying themſelves, it would preſent it's Equator to the Sun with as much regularity as it deſcribes it's annual courſe round him. From thoſe two conſtant motions never could be produced that other motion ſo varied, by which it daily inclines one of it's Poles toward the Sun, till it's axis has formed, on the plane of it's annual circle, an angle of twenty-three degrees and an half; then that other retrograde motion, by which it preſents to him, with equal regularity, the oppoſite Pole. Far from preſenting to him alternately it's Poles, in order that his fertilizing heat may, by turns, melt their ices, it would retain them buried in eternal night and Winter,

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with a part of the temperate Zones, whereas the reſt of it's circumference would be burnt up by the too conſtant fires of the Tropics.

But if we ſuppoſe, together with thoſe conſtant Laws of attraction and projection, a third variable Law, which gives to the Earth the movement that produces the ſeaſons, and a fourth, which gives it the diurnal motion of rotation round itſelf; and that no one of theſe Laws, ſo oppoſite, ſhould ever ſurpaſs the others, and, at laſt, determine it to obey but one ſingle impulſion; it would be impoſſible to affirm, that they had determined the forms and movements of the bodies which are on it's ſurface. Firſt, the force of projection, or centrifugal, would not have left upon it any one detached body. On the other hand, the force of attraction, or gravity, would not have permitted the mountains to riſe, and ſtill leſs the metals, which are the heavieſt part of them, to be placed at their ſummits, where they are uſually found.

If we ſuppoſe that thoſe Laws are the *ultimatum* of chance, and that they are ſo combined, as to form, among themſelves, but one ſingle Law; for the ſame reaſon that they make the Earth move round the Sun, and the Moon round the Earth, they ought to act in the ſame manner on the particular bodies which are at the ſurface of the Globe.

Globe. We ought to ſee the rocks detached, the fruits ſeparated from the trees, the animals which are not provided with claws turning round it in the air, as we ſee the particles which compoſe *Saturn*'s ring turn round that Planet.

It is the gravity, they repeat, which acts only at the ſurface of the Globe, that hinders bodies to detach themſelves from it. But if it there abſorbs the other powers, Wherefore, as we have already aſked, did it permit the mountains to riſe? How comes it that the centrifugal force ſhould have been able to exalt, to a prodigious height, the long ridge of the Cordeliers, while it has left immoveable the volatile ſcurf of ſnow which covers them? For what reaſon, if the action of gravity is ſtill univerſal, has it no influence on the ſoft bodies of animals, when, ſhut up in the womb of the mother, or in the egg, they are in a ſtate of fluidity? All the numerous progeny of the Earth, animals and vegetables, ought to be rounded into balls, like their mother. The weightieſt parts of their bodies, at leaſt, ought to be ſituated undermoſt, eſpecially in thoſe which poſſeſs ſelf-motion; on the contrary, they are frequently uppermoſt, and ſupported by limbs much lighter than the reſt of the animal, as in the caſe of the horſe and the ox. Sometimes they are between the head and the feet, as in the oſtrich; or at the extremity

mity of the body, in the head, as in the human ſpecies. Others, ſuch as the tortoiſe, are flattened; others, ſuch as reptiles, are drawn out in form of ſpindles; all of them, in a word, have forms infinitely varied.

Vegetables themſelves, which ſeem entirely ſubjected to the action of the elements, have configurations diverſified without end. But, How comes it that animals have in themſelves the principles of ſo many motions, ſo entirely different? Wherefore has not gravity nailed them down to the ſurface of the Earth? They ought to crawl along it at moſt. How comes it to paſs, that the Laws which regulate the courſe of the Stars; thoſe Laws whoſe influence has, in modern times, been made to extend even to the operations of the human ſoul, ſhould permit the birds to riſe into the air, and fly as they pleaſe to the Weſt, to the North, to the South, notwithſtanding the united powers of the attraction, and of the projection of the Globe?

It is conformity, adaptation to uſe, which has regulated thoſe Laws, and which has generalized, or ſuſpended their effects, in ſubordination to the neceſſities of ſenſible beings. Though Nature employs an infinity of means, ſhe permits Man to know only the end which ſhe has in view. Her Works are ſubjected to rapid diſſolutions; but ſhe

ſhe always ſuffers him to perceive the immortal conſiſtency of her plans. It is on this ſhe wiſhes to fix his heart and mind. She aims not at rendering Man ingenious and proud; her object is to render him good and happy. She univerſally mitigates the evils which are neceſſary; and univerſally multiplies bleſſings in many caſes ſuperfluous. In her harmonies, formed of contraries, ſhe has oppoſed the empire of death to that of life; but life endures for a whole age, and death only an inſtant. She allows Man long to enjoy the expanſions of beings, ſo delightful to behold; but conceals from him, with a precaution truly maternal, their tranſient ſtates of diſſolution.

If an animal dies; if plants are decompounded in a moraſs, putrid emanations, and reptiles of a diſguſting form, chace us away from them. An infinite number of ſecondary beings are created for the purpoſe of haſtening forward the decompoſitions. If cavernous mountains and rocks preſent appearances of ruin; owls, birds of prey, the ferocious animals, which have made them their retreat, keep us at a diſtance from them. Nature drives far from us the ſpectacles and the miniſters of deſtruction, and allures us to her harmonies. She multiplies them, in ſubſerviency to our neceſſities, far beyond the Laws which ſhe ſeems to have preſcribed to herſelf, and beyond the meaſure

ſure which we had reaſon to expect. It is thus that the dry and barren rocks repeat, by their echos, the murmuring ſound of the waters and of the foreſts; and that the plane ſurfaces of the waters, which have neither foreſts nor hills, repreſent their colours and forms by reflecting them.

From a profuſion of this unbounded benevolence of Nature it is, that the action of the Sun is multiplied wherever it was moſt neceſſary; and is mitigated in all the places where it would have been hurtful. Firſt, the Sun is five or ſix days longer in our northern Hemiſphere, becauſe that Hemiſphere contains the greateſt part of the Continents, and is the moſt inhabited. His diſk appears in it before he riſes, and after he is ſet; which, added to it's twilights, conſiderably increaſes the natural length of our days. The colder that it is, the farther does the refraction of his rays extend. This is the reaſon that it is greater in the morning than in the evening, in Winter than in Summer, and at the beginning of Spring than at the beginning of Autumn.

When the Orb of Day has left us, during the night ſeaſon, the Moon appears, to reflect his light upon us, with varieties in her phaſes which have relations, hitherto unknown, to a great number of ſpecies of animals, and eſpecially of fiſhes, which travel

travel only in the night-time, at the epochas which ſhe indicates to them. The farther that the Sun withdraws from one Pole, the more are his rays refracted there. But when he has entirely abandoned it, then it is that his light is ſupplied in a moſt wonderful manner. Firſt, the Moon, by a movement altogether incomprehenſible, goes to replace him there, and appears perpetually above the Horizon, without ſetting, as was obſerved in the year 1596, at Nova Zembla, by the unfortunate Dutchmen who wintered there, in the 76th degree of North Latitude.

It is in thoſe dreadful climates, that Nature multiplies her reſources, in order to beſtow on ſenſible beings the benefits of light and heat. The Heavens are there illuminated with the *aurora-borealis*, which darts up to the very zenith rays of moving light, gold-coloured, white, and red. The Poles ſparkle with ſtars more luminous than thoſe which appear in the reſt of the firmament. The ſnows which cover the ground ſhelter part of the plants, and, by their luſtre, diſpel the darkneſs of night. The trees are clothed with thick moſſes, which catch fire from the ſmalleſt ſpark; the very ground is covered with them, eſpecially in the woods, to ſo great a depth, that I have, oftener than once, ſunk, in the Summer time, up to the knees, in thoſe of Ruſſia: Finally, the animals,

mals, which inhabit thoſe regions, are robed in fur to the very tip of their claws.

When the ſeaſon returns for reſtoring heat to thoſe climates, the Sun re-appears there a conſiderable time before his natural term. Thus, the Dutch mariners, whom I have juſt mentioned, ſaw him, to their aſtoniſhment, above the Horizon of Nova Zembla, on the twenty-fourth of January, that is, fifteen days ſooner than they expected him. This return, ſo much earlier than their hopes had faſhioned it, filled them with joy, and diſconcerted the calculations of their intelligent pilot, the unfortunate *Barents*.

It is then that the Star of Day there redoubles his heat and his light, by means of the parhelions, which, like ſo many mirrors formed in the clouds, reflect his diſk upon the Earth. He calls from Africa the winds of the South, which, paſſing over Zara, whoſe ſands are then violently heated by the vicinity of the Sun to their Zenith, load themſelves with igneous particles, and proceed to attack, like battering rams of fire, that tremendous cupola of ice which covers the extremity of our Hemiſphere. It's enormous vaultage, diſſolved by the heat of thoſe winds, and looſened by their violent agitations, detaches itſelf in fragments as lofty as mountains; and, floating at the diſcretion of

of the Currents, which ſweep them along toward the Line, they advance ſometimes as far as to the 45th degree, cooling the Seas of the South, by their vaſt effuſions. Thus the ices of the Pole communicate coolneſs to the heated ſeas of Africa, juſt as the burning ſands of Africa tranſmit warm winds to diſſolve the ices of the Pole.

But as cold is, in it's turn, a very great bleſſing in the Torrid Zone, Nature employs a thouſand methods to extend the influence of it in that Zone, and to mitigate in it the heat and the light of the Sun. Firſt, ſhe deſtroys there the refractions of the Atmoſphere. There is ſcarcely any twilight between the Tropics, to precede the riſing of the Sun, and ſtill leſs after his ſetting. When he is in the Zenith, he veils himſelf with rainy clouds, which cool the ground, both by their ſhade and by their ſhowers. Beſides, thoſe clouds being frequently impregnated with thunder, the exploſion of their fires dilates the ſuperior ſtratum of the Atmoſphere, which is icy at the height of two thouſand five hundred fathom, under the Line, as is evident from the ſnows which perpetually cover, at that height, the ſummits of ſome of the Cordelier mountains. They cauſe to flow down, by their exploſions and concuſſions, columns of that air, congealed in the ſuperior regions of the Atmoſphere, into the inferior, which are ſuddenly cooled

cooled by it, as we feel it to be in our own climates, in Summer, immediately after a thunder ſtorm.

The effuſions of the polar ices, in like manner, cool the ſeas of the South; and the polar winds frequently blow on the hotteſt parts of their ſhores. Nature has, farther, placed in the very heart of the Torrid Zone, and in it's vicinity, chains of icy mountains, which accelerate, and redouble the effects of the polar winds, eſpecially along the ſeas, where fermentation was moſt to be dreaded, from the alluvions of the bodies of animals, and of vegetables, which the waters are there continually depoſiting. Thus, the chain of Mount Taurus, eternally covered with ſnow, commences in Africa, on the burning ſhores of Zara, and, coaſting the Mediterranean, paſſes on into Aſia, where it extends long arms, this way and that, which embrace the gulfs of the Indian Ocean. In America, in the ſame manner, the extenſive chains of the Cordeliers of Peru and Chili, with the elevated ridges in which it croſſes Braſil, cools the lengthened and burning ſhores of the South-Sea, and of the gulf of Mexico.

Theſe elementary diſpoſitions are only part of the reſources of Nature, for mitigating the heat in warm countries. She there ſhades the ground with

with creeping vegetables and trees, in form of a parafol, fome of which, fuch as the cocoa-tree of the Sechelles-iflands, and the talipot of Ceylon, have leaves from twelve to fifteen feet long, and from feven to eight feet broad. She clothes the animals of thofe regions with hairlefs fkins, and colours them, in general, as well as the verdure, with dark and dufky tints, in order to diminifh the reflexes of the heat and of the light. This laft confideration leads me here to fuggeft a few reflections on the effects of colours; the little which I fhall advance on this fubject, will be fufficient to produce conviction, that their generations are not the effect of chance; that it is from reafons profoundly wife we find one half of them proceed, in compounding themfelves, toward the light; and in their decompofition, toward darknefs; and that all the harmonies of this World are produced by contraries.

Naturalifts confider colours as accidents. But, if we attend to the general ufes for which Nature employs them, we fhall be perfuaded that there is not, even on rocks, a fingle fhade impreffed without a meaning and a purpofe. Let us obferve, in the firft place, the principal effects of the two extreme colours, white and black, with relation to the light. Experience demonftrates that, of all colours, white is that which beft reflects the rays

of

of the Sun, because it sends them back without any tint, as pure as it receives them; and that black, on the contrary, is the least adapted to their reflection, because it absorbs them. This is the reason why gardeners whiten the walls against which their espaliers are planted, in order to accelerate the maturity of their fruits, by the reverberation of the Sun's rays; and why opticians blacken the walls of the *camera-obscura*, that their reflexes may not disturb the luminous picture on the tablet.

Nature, of consequence, frequently employs to the North the white colour, in order to increase the light and heat of the Sun. Most of the lands there are whitish, or of a clear gray. The rocks and sands of northern regions are filled with mica and specular particles. Farther, the whiteness of the snows, which cover them in Winter, and the vitreous and crystalline particles of their ices, are exceedingly adapted to mitigate the action of the cold, by reflecting the light and heat in the most advantageous manner. The trunks of the birch-trees, of which the greatest part of their forests consist, are covered with a bark as white as paper. Nay, in some places, the earth is clothed with a vegetation completely white.

"In the eaſtern part," ſays an intelligent Swede, "of the lofty mountains which ſeparate Sweden "from Norway, expoſed to the utmoſt rigor of the "cold, there is a very thick foreſt, and ſingular in "this reſpect, that the pine which grows there is "rendered black, by a ſpecies of filamentous li-"chen, which hangs upon it in great abundance; "whereas the ground is covered every where "around with a white lichen, which, in luſtre, "rivals the ſnow."*

Nature there beſtows the ſame colour on moſt animals, ſuch as the white-bear, the wolf, the partridge, the hare, the ermine; others perceptibly whiten to a certain degree in Winter, ſuch as foxes and ſquirrels, which are reddiſh in Summer, and light gray in Winter. Nay, if we conſider the filiform figure of their hair, it's varniſh and tranſparency, we ſhall be ſenſible that it is contrived in the moſt proper manner for reflecting and refracting the rays of light. We ought not to imagine this whiteneſs as a degeneration, or enfeebling of the animal, as Naturaliſts have done with reſpect to the human hair, which whitens in old-

* Extract from the Natural Hiſtory of the rein-deer, by *Charles-Frederick Hoffberg*, tranſlated by M. le Chevalier de *Keralio*.

age;

age, as they tell us, from a failure of radical moiſture; for nothing can be of a cloſer contexture than moſt of thoſe furs, nor any thing more vigorous than the animals which are arrayed in them. The white-bear is one of the ſtrongeſt and moſt formidable of animals in the world; it frequently requires ſeveral muſket-ſhot to bring him down.

Nature, on the contrary, has tinged with red, with blue, with duſky, and black tints, the ſoil, the vegetables, the animals, nay, even the men, who inhabit the Torrid Zone, for the purpoſe of there abſorbing the fires of the burning Atmoſphere with which they are ſurrounded. The lands, and the ſands of the greateſt part of Africa, ſituated between the Tropics, are of a reddiſh brown, and the rocks are of a black hue. The Iſlands of France and of Bourbon, which are on the border of that Zone, are, in general, of the ſame dark complexion. I have ſeen there chickens and perroquets, not only whoſe plumage, but the ſkin itſelf, was dyed black. I have likewiſe ſeen, in thoſe iſlands, fiſhes entirely black, and eſpecially among the ſpecies which live near the ſurface of the water, over the ſhallows, ſuch as the old-woman and the thornback.

As animals whiten, in Winter, toward the North, in proportion as the Sun withdraws from them,

them, thoſe of the South aſſume dark and duſky tints, in proportion as the Sun approaches to them. When he is in the Zenith, the ſparrows of the tropical countries have breaſt-plates, and the plumage of the head, completely red. There are birds in thoſe regions which change their colour three times every year, having, if I may uſe the expreſſion, one dreſs for Spring, another for Summer, and a third for Winter, according as the Sun is in the Line, in the Tropic of Cancer, or in that of Capricorn *.

* The white colour, accordingly, increaſes the effect of the rays of the Sun, and the black weakens it. The inhabitants of Malta whiten the inſide of their apartments, in order, as they allege, to render the ſcorpions perceptible, which are very common in that iſland. In doing this, if I am not miſtaken, they commit two errors; the firſt, in miſapprehending the colour: for the ſcorpions, which there are gray, would appear ſtill better on a dark ground; the ſecond, and one of much greater importance, is their increaſing to ſuch a degree the reverberation of the light, that the eye-ſight is ſenſibly affected by it. To this cauſe I principally aſcribe the diſorder of the eye ſo frequently complained of by thoſe iſlanders. Our trades-people wear white hats, in Summer, when in the country, and complain of head-achs. All theſe evils ariſe from neglecting to ſtudy Nature. In the Iſle of France they employ, for wainſcotting, the wood of the country, which in time becomes entirely black; but this tint is too gloomy. It ſeems as if Nature had foreſeen, in this reſpect, the ſervices which Man was to derive from the interior of trees: their timber is brown in moſt of thoſe of hot countries, and white in thoſe of the northern regions, ſuch as the fir and the birch.

This, too, is very remarkable, and of confequential importance to the ufe which Nature makes of thefe colours, to the North, and to the South; namely, that in all countries, the whiteft part of the body of an animal is the belly, becaufe more heat is wanted there for promoting digeftion, and carrying on the other animal functions: and, on the contrary, the head is univerfally moft ftrongly coloured, efpecially in thofe of hot countries, becaufe, in the animal economy, that part ftands moft in need of being kept cool.

It cannot be maintained, that the bellies of animals preferve their whitenefs, becaufe that part of the body is fheltered from the Sun; and that their heads affume ftrong colouring, from being more expofed to his influence. It might appear, from reafons of analogy, that the natural effect of light ought to be, to inveft with it's luftre all the objects which it touches; and that, conformably to this, the foil, the vegetables, and the animals of the Torrid Zone ought to be white; and that darknefs, on the contrary, acting for feveral months together on the Poles, ought to clothe every object, within thofe regions, in robes of mourning. But Nature fubjects not herfelf to mechanical Laws. Whatever may be the phyfical effect of the prefence of the Sun, or of his abfence, fhe has contrived, toward the North, to impofe very black

ſpots on the whiteſt bodies, and, to the South, white ſpots on the darkeſt bodies. She has blackened the tip of the tail of the Siberian ermine, in order that theſe little animals, which are white all over, as they march along the ſnow, where they ſcarcely leave any traces of their footſteps, may be enabled to diſtinguiſh each other, when proceeding in a train, in the luminous reflexes of the long nights of the North.

Perhaps, too, this blackneſs, oppoſed to the white, may be one of thoſe decided characteriſtics with which ſhe has marked beaſts of prey; ſuch as the extremity of the black ſnout, and the black paws of the white-bear. The ermine is a ſpecies of weaſel. There are, likewiſe, in the North, foxes completely black; but they are indemnified, for the influence of the white colour, by the warmeſt and thickeſt of furs; it is the moſt valuable of all thoſe of the North. Beſides, this ſpecies of foxes is very rare, even in thoſe countries. Nature has, perhaps, clothed them in black, becauſe they live in ſubterraneous places, in the midſt of warm ſands, or in the vicinity of certain volcanos, or for ſome other reaſon, to me unknown, but correſponding to their natural calls. It is thus ſhe has clothed in white the paillencu, or bird of the Tropics, becauſe this bird, which flies at a prodigious elevation above the Sea, paſſes

part

part of it's life in the vicinity of a frozen Atmosphere. These exceptions by no means destroy the general adaptation of those two colours; on the contrary, they confirm it, seeing it is employed by Nature for diminishing, or increasing, the heat of the animal, in conformity to the temperature of the place where it lives.

I now leave it to Naturalists to explain how it comes to pass, that cold should cause to vegetate the hair of animals in the North; and why the heat should shorten, or cause to fall off, the hair of animals, to the South; in contradiction to all the Laws of systematic, nay, of experimental Physics; for we are assured, from our personal experience, that Winter retards the growth of the human hair and beard, and that Summer accelerates it.

I believe I have a glimpse of a Law very different from the Law of analogies, which we so commonly assign to Nature, because it allies itself to our weakness, by affording us a pretence to explain every thing, with the assistance of a small number of principles. This Law, infinitely varied in it's means, is that of *compensations* *. It is a consequence

* In reflecting on these compensations, which are very numerous, and, among others, on those of the light of the Sun, which embrowns bodies in order to weaken the reflexes of them, it

quence from the univerſal Law, or the mutual adaptation of things, and a ſequel of the union of contraries, whereof the harmonies of the Univerſe are compoſed. Thus it frequently happens, that effects, ſo far from being the reſults of cauſes, are oppoſite to them. For example, it has pleaſed Nature to clothe in white ſeveral birds, the inhabitants of warm regions, ſuch as the heron of the

it has ſuggeſted itſelf to my thoughts, that fire muſt, in like manner, produce matter the beſt adapted to diminiſh it's own activity. And of this I have, in fact, made frequent proof, by throwing a little aſhes on the flame blazing on my hearth. By this means I have been able to quench it ſuddenly almoſt without ſmoke. I recollect, to this purpoſe, having, ſome time ago, ſeen, in one of our ſea-ports, a great caldron full of pitch catch fire, which they were heating for careening a ſhip. Inexperienced perſons immediately attempted to extinguiſh the flame by throwing water upon it; but the boiling and inflamed matter ſpread but the more violently, in torrents of fire, over the brim of the caldron; I did not think a ſingle ladle-full would be left within the veſſel, when an old ſeaman run up, and inſtantly brought it down by throwing upon it a few ſhovels-full of aſhes. I believe, therefore, that by uniting this application with that of water, great aſſiſtance might be derived in caſe of conflagrations; for the aſhes would not only deaden the flame, without exciting that dreadful ſmoke which ariſes from it, as ſoon as the engines begin to play, but when once thoroughly moiſtened, they would retard the evaporation of the water, which is almoſt inſtantaneous, when the fire has made a conſiderable progreſs. It would afford me inexpreſſible ſatisfaction, ſhould this obſervation merit the attention of thoſe who have ability to give it, from their experience, ſagacity, and influence, all the utility of which it is ſuſceptible.

Antilles,

Antilles, and the perroquet of the Moluccas, called *cacatoës*; but ſhe has beſtowed, at the ſame time, on their plumage, a diſpoſition which weakens the reflection of it.

Farther, it is very remarkable, that ſhe has furniſhed the heads of thoſe birds with tufts and plumes of feathers, which overſhadow them, becauſe, as was formerly obſerved, the head is that part of the body, which, in the animal economy, ſtands moſt in need of being kept cool. Such is our creſted hen, which comes originally from Numidia. Nay, I do not believe, that there are to be found in any but ſouthern countries, birds with tufted heads. If there are ſome toward the North, as the lapwing, they make their appearance there only in Summer. Moſt of thoſe of the North, on the contrary, have the belly and the feet clothed with tippets formed of down ſimilar to the fineſt of wool.

This, likewiſe, is farther worthy of remark, reſpecting the white birds and quadrupeds of the South, which live in a hot Atmoſphere, namely, if I am not miſtaken, that the ſkin of them all is black, which is ſufficient to counterbalance the reflection of the colour of their exterior dreſs. *Robert Knox*, in ſpeaking of certain white quadrupeds of the Iſland of Ceylon, ſays, that their ſkin is

is entirely black. I myſelf recollect to have ſeen, at Port l'Orient, a *cacatoës*, whoſe ſtomach had been ſtripped of the feathers, and diſplayed a ſkin as black as that of a Negro. When this white bird, with his black beak, and black and naked breaſt, erected his plume, and clapped his wings, he had the complete air of an Indian King, with his crown, and mantle of feathers.

This Law of compenſations employs, therefore, means endleſsly varied, which contradict moſt of the Laws which we have laid in Phyſics; but this Law muſt itſelf be ſubjected to that of general accommodation or conformity; without which, were we to attempt to render it univerſal, it would involve us, in it's turn, in the common error. It has given riſe, in Geometry, to ſeveral axioms extremely doubtful, though of great celebrity, ſuch as the following; *the action is equal to the re-action*; and this other, which is a conſequence from it, *the angle of reflection is equal to the angle of incidence.* I ſhall not ſtop to demonſtrate in how many caſes theſe axioms are erroneous; how many actions in Nature are without re-actions; how many actions have unequal re-actions; how many angles of reflection are deranged by the very planes of incidence. It is ſufficient for me, at preſent, to repeat what I have already, oftener than once, advanced, namely, that the weakneſs of the human mind,

mind; and the vanity of our education, are inceſſantly prompting us to generalize. This mode of proceeding is the ſource of all our errors, and, perhaps, of all our vices. Nature beſtows on every being that which is adapted to it, in the moſt perfect conformity, according to the Latitude for which it is deſtined; and when the temperature of that Latitude is affected by change of ſeaſon, ſhe is pleaſed to vary, likewiſe, the adaptations. Some of thoſe adaptations are, accordingly, immutable, and others variable.

Nature frequently employs contrary means for producing the ſame effect. She makes glaſs with fire; ſhe makes it, too, with water, the cryſtal for inſtance; farther, ſhe produces it from animal-organization, ſuch as certain tranſparent ſhell-fiſh. She forms the diamond by a proceſs to us utterly unknown. Conclude now, becauſe a body has been vitrified, it muſt certainly be by the effect of fire, and rear on this perception the ſyſtem of the Univerſe! The utmoſt that we are capable of doing is to catch ſome harmonic inſtants in the exiſtence of beings. That which is vitrifiable becomes calcareous, and what is calcareous changes into glaſs, by the action of the ſame fire. Deduce then, from theſe ſimple modifications of the foſſil kingdom, invariable characters for determining the general claſſes of it!

On the other hand, Nature frequently employs, alſo, the ſame means, for producing effects directly contrary. For example, we have ſeen that, in order to increaſe the heat over the lands of the North, and to mitigate it over thoſe of the South, ſhe made uſe of oppoſite colours; ſhe produces in both the ſame effects, by covering the face of the one and of the other with rocks. Theſe rocks are eſſentially neceſſary to vegetation. I have frequently remarked, in thoſe of Finland, ſtripes of verdure ſkirting their baſes to the South; and in thoſe of the Iſle of France, I have ſeen ſuch verdant ſtripes on the ſide averted from the Sun.

The ſame obſervations may be made in our own climate. In Summer, when every thing is parched, we frequently find green herbage under walls which have a northerly aſpect; it diſappears in Winter; but then we find it replaced in front of eminences which face ſouthward.

We have already remarked, that the icy Zones, and the Torrid Zone, contain the greateſt quantity of waters, the evaporation of which equally tempers the violence of the heat and of the cold, with this difference, that the greateſt lakes are toward the Poles, and the greateſt rivers toward the Line. There are, it is admitted, ſome lakes in the interior of Africa and of America; but they are placed

placed in elevated atmofpheres, in the centre of mountains, where they are not liable to corruption from the action of the heat; but the plains and low grounds are wafhed by the greateft currents of living water that are in the World, fuch as the Zara, the Senegal, the Nile, the Mechaffippi, the Oroonoko, the Amazon, and others.

Nature propofes to herfelf, univerfally, only the accommodation of beings poffeffed of fenfibility. This remark is all-important in the ftudy of her Works; otherwife, from the fimilitude of the means which fhe employs, or the exceptions from them, we might be tempted to doubt of the confiftency of her Laws, inftead of afcribing the majeftic obfcurity which pervades them, to the multiplicity of her refources, and to the profundity of our own ignorance.

This Law of adaptation and conformity has been the fource of all our difcoveries. It was this which wafted *Chriftopher Columbus* to America; becaufe as *Herrera* tells us *, he thought, contrary to the opinion of the Ancients, that the whole five Zones muft be inhabited, as GOD had not formed the Earth to be a defert. It is this Law which regulates our ideas refpecting objects abfolutely beyond

* *Herrera's* Hiftory of the Weft-Indies. Book i. chap. 2.

yond the reach of our examination. By means of it, though we are ignorant whether there may be men in the Planets, we are aſſured there muſt be eyes, becauſe there is light. It is this which has awakened a ſenſe of Juſtice in the heart of every man, and informs him that there is another order of things after this life is at an end. This Law, in a word, is the moſt irreſiſtible proof of the exiſtence of GOD; for amidſt ſuch a multitude of adaptations ſo ingenious, that our paſſions themſelves, reſtleſs as they are, never could have deviſed any thing ſimilar; and ſo numerous, that every day is preſenting to us ſome that have all the merit of novelty, the firſt of all, which is the DEITY, muſt undoubtedly exiſt, as He is the general conformity of all particular conformities.

It is this, above all, whoſe exiſtence we endeavour, even involuntarily, every where to trace, and to aſſure ourſelves of it in every poſſible manner. And this explains to us the reaſon why the moſt ſplendid and comprehenſive collections in Natural Hiſtory, Galleries of the choiceſt maſter-pieces in Painting, Gardens filled with the rareſt and moſt curious plants, Libraries ſtored with the moſt valuable and beſt written books; in a word, every thing that preſents to us the moſt marvellous relations of Nature, after having raiſed us to an extaſy of admiration, conclude by ſuperinducing languor

languor and fatigue. We frequently prefer to all these a rustic mountain, a rugged rock, some wild solitude, which might present to us relations newer, and still more direct.

How often, on coming out of the King's magnificent Cabinet of Natural History, do we stop mechanically to look at a gardener digging a hole in the field with his spade, or at a carpenter hewing a piece of timber with his hatchet? It looks as if we expected to see some new harmony start out of the bosom of the Earth, or burst from the side of a lump of oak. We set no value on those which we have just been enjoying, unless they lead us forward to others, which as yet we do not know. But were the complete History given us of the stars of the Firmament, and of the invisible Planets which encircle them, we should perceive in them a multitude of ineffable plans of intelligence and goodness, after which the heart would continue fondly to sigh: it's last and only end is the DIVINITY himself.

STUDY ELEVENTH.

APPLICATIONS OF SOME GENERAL LAWS OF NATURE TO PLANTS.

BEFORE I proceed to ſpeak of plants, I muſt be indulged in making a few reflections on the language of Botany.

We are ſtill ſo young in the ſtudy of Nature, that our languages are deficient in terms to expreſs her moſt common harmonies. This is ſo true, that however exact the deſcriptions of plants may be, and compiled by Botaniſts of whatever ability, it is impoſſible to diſtinguiſh them in the fields, unleſs you have previouſly ſeen them in Nature, or, at leaſt, in a herbary. Perſons who think they have made the greateſt proficiency in Botany, need only attempt to draw on paper a plant which they have never ſeen, after the deſcription of the moſt accurate Maſter, to be convinced how widely the copy deviates from the original.

 Men

Men of genius have, neverthelefs, taken inexpreffible pains to affign characteriftic names to the different parts of plants. They have even borrowed moft of thofe names from the Greek, a language of fingular energy of expreffion. From this has refulted another inconveniency; it is, that thofe names, being for the moft part compounds, cannot be rendered into modern language; and for this reafon it is that a great part of the Works of *Linnæus* are abfolutely incapable of tranflation. Thefe learned and myfterious expreffions, no doubt, diffufe a venerable air over the ftudy of Botany; but Nature has no need of fuch refources of human art to attract our refpect. The fublimity of her Laws can eafily difpenfe with the emphafis and obfcurity of our expreffions. The more light a man carries in his own bofom, the more wonderful he efteems it to be.

After all, moft of thofe foreign names, employed particularly by the herd of Botanifts, do not fo much as exprefs the moft common characters of vegetables. They frequently make ufe, for example, of fuch vague expreffions as thefe, *fuavè rubente*, *fuavè olente*, of an agreeable red, fweet-fmelling, in order to characterize flowers; without expreffing the fhade of red, or the fpecies of perfume. They are ftill more embarraffed, when they wifh to convey the dufky colours of the

the ſtem, of the root, or of the fruit: *atro-rubente*, ſay they, *fuſco-nigreſcente*, of a dark red, of a duſky brown. As to the forms of vegetables, the caſe is ſtill worſe, though they have fabricated terms compounded of four or five Greek words to deſcribe them.

J. J. Rouſſeau communicated to me, one day, a ſet of characters ſomewhat reſembling the algebraic, which he had invented for the purpoſe of briefly expreſſing the colours and forms of vegetables. Some of them repreſented the forms of the flowers; others, thoſe of the leaves; others, thoſe of the fruits. Some reſembled a heart, ſome were triangular, ſome of the lozenge ſhape. He did not employ above nine or ten of thoſe ſigns, to compoſe the expreſſion of one plant. Some he placed above others, with cyphers which indicated the genera and the ſpecies of the plant, ſo that you would have taken them for the terms of an algebraic formula. However ingenious and expeditious this method might be, he informed me that he had given it up, becauſe it preſented to him ſkeletons only.

This ſentiment came with peculiar grace from a man whoſe taſte was equal to his genius, and may ſuggeſt ſome reflections to thoſe who are for giving

abridgments of every thing, especially of the Works of Nature. The idea of *John-James*, however, well deserves to be followed up, should it only serve to produce, one day, an alphabet proper to express the language of Nature. All that seems requisite is the introduction of accents, to convey the shades of colours, and all the modifications of savours, perfumes, and forms. After all, those characters could not be delineated with perfect precision, unless the qualities of each vegetable are first exactly determined by words: otherwise the language of Botanists, which is now accused of speaking only to the ear, would make itself intelligible only to the eye.

This is what I have to propose respecting an object so highly interesting, and which will perfectly coalesce with the general principles which we shall afterwards lay down. The little which I may advance on the subject will serve to supply expression, not only in Botany, and in the study of the other natural Sciences, but in all the Arts, where we find ourselves puzzled every instant, for want of terms to convey the shades and forms of objects.

Though we have only the term *white*, whereby to express the colour which bears that name, Na-

ture

ture presents to us a great variety of sorts of it. Painting, with respect to this article, is as barren as language.

I have been told of a famous Painter of Italy, who, upon a certain occasion, found himself very much embarrassed how to represent, in one of his pieces, three figures dressed in white. The point in question was, to give effect to those figures, to be thus uniformly dressed, and to draw out different shades of the most simple, and the least compounded, of all colours. He was going to abandon his object as a thing impossible, when, happening to pass through a corn-market, he perceived the effect which he was in quest of. It was a group formed by three millers, one of whom was under a tree, the second in the half tint of the shade of that tree, and the third exposed to the rays of the Sun: so that though the drapery of all the three was white, they were completely detached from each other. He introduced a tree, therefore, amidst the three personages of his picture, and, by illuminating one of them with the rays of the Sun, and throwing over the other two different tints of shade, he was enabled to exhibit a drapery of three several casts of white.

This, however, was rather to elude the difficulty, than to resolve it. And this is, in fact, what

Painters do in ſimilar caſes. They diverſify their whites by ſhades, half-tints, and reflexes; but theſe whites are not pure; they are always diſturbed with yellow, blue, green, or gray. Nature employs ſeveral ſpecies of white, without diminiſhing the purity of it, by dotting, rumpling, radiating, varniſhing it, and in various other ways ....Thus, the whites of the lily, of the daiſy, of the lily-of-the-valley, of the narciſſus, of the anemone-nemoroſa, of the hyacinth, are all different from each other. The white of the daiſy has ſomething of that of a ſhepherdeſſes cornet; that of the hyacinth has a reſemblance of ivory; and that of the lily, half tranſparent and cryſtalline, reſembles the paſte of porcelain. I believe, therefore, that all the whites, produced by Nature, or by Art, might be referred to thoſe of the petals of our flowers. We ſhould thus have, in vegetables, a ſcale of ſhades of the pureſt white.

We might, in like manner, procure all the pure and imaginable ſhades of yellow, of red, and of blue, from the flowers of the jonquil, of the ſaffron, of the butter-flower of the meadow, of the roſe, of the poppy, of the blue bottle of the cornfield, of the larkſpur, and ſo on. We might find, in the ſame manner, among our common flowers, all the compound ſhades, ſuch as thoſe of the impurpled violet and foxglove, which are formed of the

the various harmonies of red and blue. The ſingle compound colour, made up of blue and yellow, which conſtitutes the green of our herbage, is ſo varied in every plain, that each plant, I may venture to affirm, has it's peculiar ſhade of that colour. I can have no doubt that Nature has diſplayed, in equal variety, the other colours of her palette, in the boſom of flowers, or on the ſurface of fruits.

In performing this, ſhe ſometimes employs very different tints, without confounding them; but ſhe lays them on one above another, ſo that they form the doves-neck: ſuch is the beautiful ſhag which garniſhes the corolla of the anemone; in other caſes, ſhe glazes their ſurface, as certain moſſes with a green ground, which are glazed over with purple; ſhe velvets others, ſuch as the panſy; ſhe powders over ſome fruits with a delicately fine flour, ſuch as the purple plumb, diſtinguiſhed by the addition of *de Monſieur*; or inveſts them with a light down to ſoften their vermilion, as the peach; or ſmooths their ſkin, and gives the brighteſt luſtre to their colours, as to the red of the apple of Calleville.

What embarraſſes Naturaliſts the moſt, in denominating colours, is to find diſtinctive epithets for ſuch as are duſky; or rather, this gives them

no manner of concern: for they evade the difficulty by the vague and indecisive expressions, of blackish, gray, ash-coloured, brown, which they convey, it is true, in Greek and Latin words. But those words frequently answer no purpose, except to confound their images, by giving no representation whatever; for what, in good earnest, is meant by these, and such like, epithets, *atro-purpurante*, *fusco-nigrescente*, which they employ so frequently?

It is possible to make thousands of tints widely different from each other, to which such general expressions might be applied. As those dark shades, in truth, are much compounded, it is exceedingly difficult to characterize them by the phraseology of our common vocabularies. But this might be easily and effectually accomplished, by referring them to the different colours of our domestic vegetables. I have remarked in the barks of our trees and shrubbery, in the capsules and shells of their fruits, as well as in the dead leaves, an incredible variety of those sad and gloomy shades, from yellow down to black, with all the intermixtures and accidents of the other colours. Thus, instead of saying in Latin, a yellow inclining to black, or an ash-coloured tint, in order to determine some particular shade of colour in a production of Art, or of Nature, we might say a yel-

low

low of the colour of a dried walnut, or a gray like the bark of a beech-tree.

Thofe expreffions would be fo much the more exact, that Nature invariably employs fuch tints in vegetables, as determining characters and indications of maturity, of vigor, or of decay; and that our peafantry can diftinguifh the different fpecies of wood in the forefts by infpection of their bark fimply. Thus, not Botany alone, but all the Arts, might find, in vegetables, an inexhauftible dictionary of unvarying colours, which would not be embarraffed with barbarous and technical compound words, but which would continually prefent new images. Our books of Science would thence derive much pleafing vivacity, from being embellifhed by comparifons and expreffions borrowed from the lovelieft kingdom of Nature.

The great Poets of Antiquity carefully availed themfelves of this, by referring moft of the events of human life to fome appearance of the vegetable kingdom. Thus *Homer* compares the fleeting generations of feeble mortals to the leaves which drop from the trees of the foreft, at the end of Autumn; the frefhnefs of beauty to that of the rofe; and the palenefs which overfpreads the countenance of a young man wounded to death in battle, as well as the attitude of his drooping head, to the colour and

and the fading of a lily, whose root has been torn up by the plough. But we satisfy ourselves with repeating the expressions of men of genius, without daring to tread in their footsteps. This, however, is not the worst, for most Naturalists consider the colours themselves of vegetables as accidents simply. We shall presently see under what a grievous mistake they labour, and how widely they have deviated from the sublime plans of Nature, by persisting in a prosecution of their mechanical and systematic methods.

It is possible, in like manner, to trace an approximation of savours and smells of every species, and of every country, to those of the plants of our gardens and of our fields. The ranunculus of the meadow has the acridity of the Java-pepper. The root of the caryophyllata, or holy-thistle, and the flower of the pink, smell like the clove of Amboyna. As to compound savours and smells, they may be referred to such as are simple, the elements of which Nature has scattered over all climates, and which she has united in the class of vegetables. I know a species of morel, used as food by the Indians, which, when boiled, has the taste of beef. They call it *bret.e.* There is a species of the cranes-bill, the leaf of which resembles, in smell, a roasted leg of mutton. The muscari, a species of small hyacinth, which grows among shrubbery

early

early in the Spring, ſmells very ſtrongly of the plumb. It's ſmall monopetalous flowers, of a delicate blue colour, and with lips or inciſions, have likewiſe the form of that fruit.

By approximations ſuch as theſe, the Engliſh Navigator *Dampier*, and Father *du Tertre*, have given us, as far as I can judge, the moſt accurate notions of the fruits and flowers which grow between the Tropics, by referring them to the fruits and flowers of our own climates. *Dampier*, for example, in order to deſcribe the banana, compares it, when ſtripped of it's thick five-panneled ſkin, to a large ſauſage; it's ſubſtance and colour to freſh butter in Winter; it's taſte, a mixture of apple and of the pear known by the name of the good-chriſtian, which melts in the mouth like marmalade. When this traveller deſcribes ſome good fruit of the Indies, he ſets your mouth a-watering. He poſſeſſes a naturally ſound underſtanding, ſuperior, at once, to the methodical trammels of the learned, and to the prejudices of the vulgar. He maintains, for inſtance, and with truth on his ſide, in oppoſition to the opinion of moſt navigators, that the plantain, or banana, is the king of fruits, without excepting even the cocoa. He informs us, that this is likewiſe the opinion of the Spaniards, and that multitudes of families live, between the Tropics, on this pleaſant, wholeſome,

and

and nouriſhing fruit, which laſts all the year round, and ſtands in no need of any of the arts of cookery.

Father *du Tertre* is not leſs happy, nor leſs accurate, in his botanical deſcriptions. Theſe two travellers give you, at a ſingle ſtroke, by means of trivial ſimilitudes, a preciſe idea of a foreign vegetable, which you would ſearch for to no purpoſe in the Greek names of our firſt-rate Botaniſts. This mode of deſcribing Nature, by ordinary images and ſenſations, is held in contempt by the learned; but I conſider it as the only one capable of exhibiting pictures, that have a reſemblance, and as the true character of genius. With ſuch aſſiſtance, you will be enabled to paint every natural object, and may diſpenſe with methods and ſyſtems; without it you will only coin phraſes.

Let us now ſuggeſt a few thoughts reſpecting the form of natural objects. It is here that the language of Botany, and even thoſe of the other Arts, are peculiarly barren. Geometry, whoſe particular object this is, has invented ſcarcely more than a dozen of regular curves, which are known to only a ſmall number of the learned; and Nature employs an infinite multitude of them in the forms of flowers alone. Some of the uſes of theſe we ſhall preſently indicate. Not that I mean to make of a ſtudy

ſtudy prolific of delight, a ſublime Science, worthy only of the genius of a *Newton.* As Nature has introduced, in my opinion, not only the colours, the ſavours, and the perfumes, but likewiſe every model of form into the leaves, the flowers, and the fruits of all climates, whether in trees, in herbage, or in moſſes; the vegetable forms of other parts of the World, might be referred to thoſe of our own country which are moſt familiar to us. Such approximations would be much more intelligible than Greek compound words, and would manifeſt new relations in the different claſſes of the ſame kingdom.

They would be no leſs neceſſary for expreſſing the aggregations of the flowers on their ſtems, of the ſtems round the root, and the groups of young plants around the parent-plant. It may be affirmed, that the names of moſt of theſe vegetable aggregations and diſpoſitions are yet to be invented; the greateſt Maſters not having been fortunate in characterizing them, or, to ſpeak without reſerve, not having made it any part of their ſtudy. For example, when *Tournefort* * ſpeaks, in his Voyage to the Levant, of a heliotrope of the Iſle of Naxos, which he characterizes thus, *heliotropum humifuſum, flore minimo, ſemine magno*, the creeping heliotrope,

* *Tournefort*'s Voyage to the Levant, vol. i.

with

with a very ſmall flower and a large ſeed; he ſays that it has it's flowers diſpoſed in form of an ear of corn, going off in a ſcorpion's tail. There are two miſtakes in this deſcription; for the flowers of this heliotrope, ſimilar, from their aggregation, to the flowers of the heliotrope of our climates, and to that of Peru, are not diſpoſed in form of an ear of corn, for they are arranged on a horizontal ſtem, and only on one ſide; and they bend downward, like the tail of a ſnail, and not upward, like the tail of a ſcorpion.

The ſame inaccuracy, in reſpect of image, is to be found in the deſcription which he gives us of the *ſtachis Cretica latifolia*, the broad-leaved ſtachis of Crete: it's flowers, ſays he, are diſpoſed in rings. No one can imagine he intends to convey this meaning, that they are diſpoſed like the diviſions of the king of the cheſs-board. Under this form, however, they are repreſented in the drawing of *Aubriet*, his deſigner. I do not know any botanic expreſſion which conveys this character of ſpherical aggregations in ſeparate ſtories of alternate ſwellings and ſinkings, and terminating in a pyramid. *Barbeu du Bourg*, who poſſeſſes much imagination with little exactneſs, calls this form verticillate, for what reaſon I know not. If it is from the Latin word *vertex*, head or ſummit, becauſe theſe flowers, thus aggregated, form ſeveral

ſeveral ſummits, this denomination would be more applicable to ſeveral other plants; and, beſides, does not expreſs the ſwellings, the ſinkings, and the progreſſive diminution of the flowers of the ſtachis.

Tournefort derives it from the Latin word *verticillus*; that is, ſays he, a ſmall weight perforated circularly to receive the end of a ſpindle, in order to make it whirl with greater facility. This is going a great way, in queſt of a very imperfect ſimilitude, to an utenſil by no means generally known. In ſaying this, however, I would not be conſidered as failing in the reſpect which is due to ſuch a man as *Tournefort*, who firſt cleared for us the botanic path, and was, beſides, a perſon of profound erudition. But from this careleſſneſs of the great Maſters, we may form a judgment of the vague, inaccurate, and incoherent expreſſions which fill the vocabulary of Botany, and diffuſe obſcurity over it's deſcriptions.

After all, I ſhall be aſked, How would you characterize the aggregation of the flowers of the two plants which have juſt been mentioned? By referring them to aggregations ſimilar to thoſe of the plants of our climates. In this there can be no difficulty: thus, for example, we might refer the aſſemblage of the flowers of the Grecian heliotrope,

trope, to that of the French, or Peruvian heliotrope: and that of the flowers of the Cretan ftachis, to that of the flowers of the horehound, or of the pennyroyal. To this might afterwards be added the differences in colour, fmell, favour, which diverfify the fpecies of it. There is no occafion to compound foreign terms to defcribe forms which are familiar to us. Nay, I defy any one to convey by Greek and Latin words, and with the moft learned turn of periphrafis, the fimple colour of a bark of a tree. But if you tell me it refembles that of an oak; I have the fhade of it at once.

Thefe approximations of plants have this farther utility, that they prefent us with the combined whole of an unknown object, without which we can form no determinate idea of it. This is one of the defects of Botany, it exhibits the characters of vegetables only in fucceffion; it does not collect them, it decompounds them. It refers them, indeed, to a claffical order, but not to an individual order. This, however, is the only one which the weaknefs of the human mind permits us to catch. We love order, becaufe we are feeble, and becaufe the leaft confufion difturbs us; now, there is no order which we can adopt more eafily than that which approaches to an order which is familiar to us, and which Nature is every where prefenting.

ſenting. Try to deſcribe a man feature by feature, limb by limb; be ever ſo exact, yet you never will be able to give me his portrait: but if you refer him to ſome known perſonage; if you tell me, for example, that he is of the make and mien of a Don Quixote; or with a noſe like that of St. *Charles Baromeo*, and ſo on, and you paint me his picture in four words. It is to the whole of an object that the ignorant, an epithet which includes the greateſt part of Mankind, attach themſelves in the firſt inſtance, in order to acquire the knowledge of it.

It would, therefore, be of eſſential importance to have, in Botany, an alphabet of colours, ſavours, ſmells, forms, and aggregations, derived from our moſt common plants. Thoſe elementary characters would enable us to expreſs ourſelves exactly in all the parts of Natural Hiſtory, and to preſent to ourſelves relations equally new and curious.

In hope that perſons of ſuperior intelligence may hereafter be induced to take up the ſubject, I proceed to the diſcuſſion of it with what ability I have, notwithſtanding the embarraſſment of language.

When we ſee a multitude of plants, of different forms, vegetate on the ſame ſoil, there is a diſpoſition to believe, that thoſe of the ſame climate

grow indifferently every where. But thofe only which are produced in places particularly affigned to them by Nature, attain there all the perfection of which they are fufceptible. The fame thing holds good with refpect to animals. Goats are fometimes reared in marfhy places, and ducks on the mountains; but the goat never will acquire, in Holland, the beauty of that which Nature clothes with filk on the rocks of Angora; nor will the duck of Angora ever attain the ftature and the colours of thofe which are to be found in the canals of Holland.

If we throw a fimple glance on plants, we fhall perceive that they have relations to the elements which promote their growth; that they have relations to each other, from the groups which they contribute to form; that they have relations to the animals which derive nourifhment from them; and, finally, to Man, who is the centre of all the Works of Creation. To thefe relations I give the name of harmonies, and I divide them into elementary, into vegetable, into animal, and into human.

By propofing this divifion, I fhall reduce to fomething like order the difquifition on which I am going to enter. It cannot be fuppofed that I fhould examine them in detail: thofe of a fingle fpecies

ſpecies would furniſh ſpeculations, which the application of a whole life could not exhauſt; but I ſhall unfold enough of their general harmonies to produce conviction, that an infinite Intelligence reigns in this amiable part of Creation, as in the reſt of the Univerſe.

We ſhall thus make application of the Laws which we have previouſly eſtabliſhed, and ſhall take a glimpſe of a multitude of others, equally worthy of reſearch, and equally calculated to excite admiration. Reader, be not aſtoniſhed at either their number, or their extent. Let this great truth be deeply impreſſed on thy heart: GOD *has made nothing in vain!* A ſcholar, with his ſyſtems and methods, finds himſelf ſtopped ſhort in Nature every ſtep he takes; while furniſhed with this as a key, the ignorant ruſtic is able to unlock every door of knowledge.

ELEMENTARY HARMONIES OF PLANTS.

Plants have as many principal parts as there are elements with which they keep up a relation. By their flowers, they ſtand related to the Sun, which fecundates their ſeeds, and carries them on to maturity; by their leaves, they are related to the waters, which bedew them; by their ſtems, to the

winds which agitate them; by their roots, with the ground which ſuſtains them; and by their grains, with their ſituations adapted to their growth and increaſe. Not that theſe principal parts have no indirect relations beſides to the other elements, but it will be ſufficient for our purpoſe to dwell on ſuch as are immediate.

Elementary Harmonies of Plants with the Sun, by the Flowers.

Though Botaniſts may have made great and laborious reſearches reſpecting plants, they have paid no attention to any of thoſe relations. Fettered by their ſyſtems, they have attached themſelves to the conſideration of them, particularly on the ſide of the flowers: and have arranged them in the ſame claſs, wherever they found theſe external reſemblances, without ſo much as enquiring what might be the particular uſe of the florification. They have, indeed, diſtinguiſhed in it the ſtamina, the antheræ, and the ſtigmata, for the fecundation of the fruit, but, excepting this, and ſome others, which reſpect the interior organization, they have neglected, or miſunderſtood, the relations which the whole plant has with the reſt of Nature.

This

This partial divifion has led them into the ftrangeft confufion; for, by confidering the flowers as the principal characters of vegetation, and by comprehending in the fame clafs thofe which were fimilar, they have united plants entirely foreign to each other, and have feparated, on the contrary, many which are evidently of the fame genus. Such is, in the firft cafe, the fullers-thiftle, called *dipfacus*, which they clafs with the fcabious, becaufe of the refemblance of fome parts of it's flower; though it prefents in it's branches, it's leaves, it's fmell, it's feed, it's prickles, and the reft of it's qualities, a real thiftle: and fuch is, in the fecond, the great cheftnut of India, which they exclude from the clafs of cheftnut-trees, becaufe it has different flowers. To clafs plants from the flowers, that is, from the parts of their fecundation, is the fame thing with claffing animals from thofe of generation.

However, though they have referred the character of a plant to it's flower, they mifunderftand the ufe of it's moft fhining part, which is that of the corolla. They call that the corolla, which is, in common language, denominated the leaves of a flower. It is a Latin word, fignifying a little crown, from the difpofition of the leaves, in many fpecies, in the form of coronets, and they have given the name of petals to the divifions of that

 crown.

crown. Some, in truth, have acknowledged it to be properly adapted for covering the parts of fecundation before the expanſion of the flower; but it's calix is much better adapted to this purpoſe, from it's thickneſs, from it's beards, and ſometimes from the prickles with which it is inveſted. Beſides, when the corolla leaves the ſtamina expoſed, and when it continues fully blown for whole weeks, it muſt of neceſſity be anſwering ſome other purpoſe; for Nature does nothing in vain.

The corolla ſeems intended to reverberate the rays of the Sun on the parts of fecundation; and we ſhall be put beyond the reach of doubt as to this, if we conſider the colour and the form of it in moſt flowers. It has been remarked in the preceding Study, that of all colours, white is the moſt proper for reflecting the heat: now, it is, in general, that which Nature beſtows on the flowers that blow at cold ſeaſons and in cold places, as we ſee is the caſe in the ſnow-drop, the lily of the valley, the hyacinth, the narciſſus, and the anemone nemeroſa, which come into flower early in the Spring. We muſt likewiſe aſſign to this colour ſuch as have ſlight ſhades of the roſe and of the azure, as many hyacinths; as well as thoſe which have yellow and ſhining tints, as the flowers of the dandelion, the butter-flower of the meadow,

and

and the wall gilly-flower. But ſuch as blow at warm ſeaſons, and in warm ſituations, as the cockle, the wild poppy, and the blue-bottle, which grow in Summer amongſt the corn, are dreſſed in ſtrong colours, ſuch as purple, deep red, and blue; for theſe abſorb the heat without greatly reflecting it.

I do not know, however, that there are any flowers entirely black; for in that caſe, it's petals, deſtitute of all power of reflection, would be entirely uſeleſs. In general, of whatever colour a flower may be, the under part of it's corolla, which reflects the rays of the Sun, is of a much paler tint than the reſt. This is ſo very remarkable, that Botaniſts, who generally conſider the colours of flowers as accidents merely, diſtinguiſh it by the name of *unguiculus* (a little nail). The unguicle is that with relation to the flower which the belly is with relation to animals: it's ſhade is always clearer than that of the reſt of the petal.

The forms of flowers are no leſs adapted than their colours to reflect the heat. Their corollæ, divided into petals, are only an aſſemblage of mirrors directed toward one focus. Of theſe they have ſometimes four, which are plain, as the flower of the cole-wort in the cruciform; or a complete circle, as the daiſy in the claſs of radiated; or

 ſpherical

ſpherical portions, as the roſe; or entire ſpheres, as the bells of the lily of the valley; or cones mutilated, as the foxglove, the corolla of which is formed like a ſewing thimble.

Nature has placed, at the focuſes of theſe, plain, ſpherical, elliptical, parabolic, and other mirrors, the parts of the fecundation of plants, as ſhe has placed thoſe of generation in animals, in the warmeſt parts of their bodies. Theſe curves, which Geometricians have not yet examined, merit their moſt profound reſearches. Is it not aſtoniſhing, that they ſhould have beſtowed ſuch learned pains to find out curves altogether imaginary, and frequently uſeleſs; and that they ſhould have neglected to ſtudy thoſe which Nature employs ſo regularly, and in ſuch variety, in an infinite number of objects? Be this as it may, Botaniſts have given themſelves ſtill leſs trouble about the matter. They comprehend thoſe of flowers under a ſmall number of claſſes, without paying the ſlighteſt attention to their uſe, nay, without ſo much as apprehending that they could have any. They confine themſelves entirely to the diviſion of their petals, which frequently change nothing of the configuration of their curves; and they frequently claſs under the ſame name thoſe which are the moſt oppoſite. Thus, under the general deſigna-

tion

tion of the *monopetalous*, (thoſe that have a ſingle petal) they include the ſpheroïd of the lily of the valley, and the trumpet of the convolvulus.

On this ſubject, a very remarkable circumſtance claims our notice; namely, that, frequently, ſuch as is the curve formed by the border, or upper extremity of the petal, ſuch too is the plan of the whole petal itſelf; ſo that Nature preſents to us the cut or ſhape of each flower in the contour of it's petals, and gives us, at once, it's plan and it's elevation. Thus roſes, and the whole tribe bearing this denomination, have the border of their petals in ſections of a circle, like the curve of the flowers themſelves; the pink and blue-bottle, which have their ſelvage notched, preſent the plans of their flowers plaited up like fans, and form a multitude of focuſes.

For want of the real flower, theſe curious remarks may be verified from the drawings of Painters who have been the moſt exact in copying plants, but who are indeed very few in number. Such is, among thoſe few, *Aubriet*, who has drawn the plants of *Tournefort*'s voyage to the Levant *, with the taſte of a Painter, and the preciſion of a Botaniſt. You may there ſee the confirmation of

* *Tournefort*'s Voyage to the Levant, vol. i.

what

what I have juſt been advancing. For example, the *ſcorzonera Græca ſaxatilis & maritima foliis variè laciniatis*, (the Greek ſaxatile and marine ſcorzonera, with leaves variouſly ſcolloped) which is there repreſented, has it's petals, or half-flowers, ſquared at the extremity, and plane in their ſurface. The flower of the *ſtachis Cretica latifolia*, (the broad-leaved ſtachis of Crete) which is a monopetalous tubular plant, has the upper part of it's corolla undulated, as well as it's tube. The *campanula Græca ſaxatilis jacobeæ foliis*, (the Greek bell-flower of the rocks, with ragwort leaves) preſents theſe conſonances in a manner ſtill more ſtriking. This campanula, which *Tournefort* conſiders as the moſt beautiful he had ever ſeen, and which he ſowed in the Royal Garden at Paris, where it ſucceeded very well, is of the pentagonal form. Each of it's faces is formed of two portions of a circle, the focuſes of which, undoubtedly, meet on the ſame anthera; and the border of this campanula is notched into five parts, each of which is likewiſe cut into the form of a Gothic arch, as each ſubdiviſion of the flower is. Thus, in order to know, at once, the curve of a flower, it is ſufficient to examine the brim of it's petal.

It is of much utility to attend to this obſervation, for otherwiſe it would be extremely difficult to determine the focuſes of the petals. Beſides, flowers

flowers lose their internal curves in herbaries. I believe these consonancies to be general; I presume not, however, to assert, that they admit of no exceptions. Nature may deviate from this order, in some species, for reasons which I know not. It cannot be too frequently repeated; She has no general and unvarying Law, except the accommodation of beings endowed with sensibility. The relations just now suggested, between the curve of the brim and that of the petal, seem, beside, to be founded on this universal Law, as they present conformities of such agreeable approximation.

The petals appear to such a degree destined to warm the parts of fecundation, that Nature has placed a circle of them around most compound flowers, which are themselves aggregations of small tubes, infinite in number, that form so many particular flowers, or, if you will, flowrets. This is obviously remarkable in the petals which surround the disks of daisies and sun-flowers. They are likewise to be met with around most of the umbelliferous plants: though each flowret which composes them, has it's particular petals, there is a circle of others still greater, which encompasses their assemblage, as you may see in the flowers of the daucus.

Nature has ftill other means of multiplying the reflexes of heat in flowers. Sometimes fhe places them on ftems of no great elevation, in order to collect warmth from the reflections of the Earth; fometimes fhe glazes over their corollæ with a fhining varnifh, as the yellow meadow-ranunculus, known by the trivial name of butter-flower. Sometimes fhe withdraws the corolla, and makes the parts of fecundation to fhoot from the partition of an ear, of a cone, or of the branch of a tree. The forms of the fpike, and of the cone, appear to be the beft adapted for reverberating on them the action of the Sun, and to enfure their fructification; for they always prefent fome one fide or another fheltered from the cold. Nay, it is very remarkable, that the aggregation of flowers, in a conical and fpike form, is very common to herbs and to trees of the North, and rarely to be found in thofe of the South. Moft of the gramineous plants which I have feen in fouthern Countries, do not carry their grains in a fpike, or clofely compacted ear, but in flowing tufts, and divided into a multitude of particular ftems, as the millet and rice. The maize, or Turkey-corn, I admit, bears it's grains in a large ear; but that ear is for a confiderable time fhut up in a bag; and on burfting from it, pufhes away over it's head a long covering of hair, which feems entirely deftined to the purpofe

pose of sheltering it's flowers from the heat of the Sun.

Finally, what confirms me in the belief, that the flowers of plants are adapted to the action of heat, conformably to the nature of every climate, is this, that many of our European plants vegetate extremely well in the Antilles-Islands, but never come to seed there. Father *du Tertre* observed, that in those islands *, the cabbage, the sainfoin, the lucern, the savory, the sweet basil, the nettle, the plaintain, the wormwood, the sage, the liver-wort, the amaranth, and all our species of gramineous plants, throve there wonderfully well, but never produced grains. These observations demonstrate, that it is neither the air, nor the soil, which is inimical to them; but the Sun, which acts with too much vivacity on their flowers; for most of these plants have theirs aggregated into an ear, which greatly increases the repercussion of the solar rays.

I believe, at the same time, that such plants might be naturalized in the West-India Islands, as well as many others of our temperate climates, by selecting from the varieties of their species, those whose flowers have the smallest fields, and

* Natural History of the Antilles, by Father *du Tertre*.

whose

whoſe colours are the deepeſt, or thoſe whoſe pannicles are divergent.

Not that Nature has no other reſources except ſuch as theſe, to make plants of the ſame genus attain perfection in different ſeaſons and climates. She can render their flowers capable of reflecting the heat, in different degrees of Latitude, without any very ſenſible alteration of the form. Sometimes ſhe mounts them on elevated ſtems, to remove them from the influence of the reflection of the ground. It is thus ſhe has placed, between the Tropics, moſt of the apparent flowers upon trees. I have ſeen but few there in the meadows, but a great many in the foreſts. In thoſe countries, you muſt look aloft, in order to have a ſight of flowers; in our native climes, we muſt caſt our eyes on the ground, for this purpoſe; for with us flowers grow on herbage and ſhrubbery. Sometimes ſhe expands them under the ſhade of leaves; ſuch are thoſe of the palm-tree, of the banana, and of the *jacquier*, which grow cloſe to the trunk of the tree. Such, likewiſe, are, in our temperate climates, thoſe large white bell-formed flowers, known by the name of Lady's-ſmock, which delight in the ſhade of the willow.

There are others, ſuch as moſt part of the convolvuluſes, which expand only in the night; others

grow

grow close to the ground, and exposed, as the pansy; but their drapery is dusky and velveted. There are some which receive the action of the Sun when at a considerable height, as the tulip; but Nature has taken her precautions so exactly, as to bring out this stately flower only in the Spring, to paint it's petals with strong colours, and to daub the bottom of it's cup with black *.

* This flower, from it's colour, is, in Persia, the emblem of perfect lovers. *Chardin* tells us, that, when a young Persian presents a tulip to his mistress, it is his intention to convey to her this idea, that, like this flower, he has a countenance all on fire, and a heart reduced to a coal. There is no one Work of Nature, but what awakens in man some moral affection. The habits of society insensibly efface, at length, the sentiment of it; but we always find it in vigor among Nations who still live near to Nature.

Many alphabets have been imagined in China, in the earlier ages, after the wings of birds, fishes, shells, and flowers: of these, very curious characters may be seen in the China illustrated of Father *Kercher*. It is from the influence of those natural manners, that the Orientals employ so many similitudes and comparisons in their languages. Though our metaphysical eloquence makes no great use of them, they frequently produce, nevertheless, a very striking effect. *J. J. Rousseau* has taken notice of that which the Ambassador of the Scythians proposed to *Darius*. Without speaking a word, he presented him with a bird, a frog, a mouse, and five arrows †. *Herodotus* relates, that the

† *Darius*, at first, understood this as a complete surrender of Scythian independance into his hands; but the event instructed him, that this high-spirited people intended to convey a bold defiance: "Unless "you can fly as a bird, dig as a mouse, swim as a frog, our arrows "shall reach you." H. H.

same

Others are diſpoſed in girandoles, and receive the effect of the ſolar rays only under one point of the compaſs. Such is the girandole of the lilach, which, pointing with various aſpects, to the Eaſt, to the South, to the Weſt, and to the North, preſents, on the ſame cluſter, flowers in bud, half open, fully blown, fading, and all the delightful ſhades of the florification.

There are flowers, ſuch as the compound, which being in a horizontal poſition, and completely expoſed, behold the Sun, like the Horizon itſelf, from his riſing to his ſetting; of this deſcription is the flower of the dandelion, But it poſſeſſes very peculiar means of ſheltering itſelf from the heat: it cloſes entirely whenever the heat becomes exceſſive. It has been obſerved to open, in Summer, at half an hour after five in the morning, and to collect it's petals toward the centre, about nine o'clock. The flower of the garden-lettuce,

ſame *Darius* ſent word to the Greeks of Ionia, who were laying waſte the country, that if they did not give over their depredations, he would treat them like pines. The Greeks, who by this time had become infected with wit, and had proportionally begun to loſe ſight of Nature, did not comprehend the meaning of this. Upon enquiry, they at length diſcovered that *Darius* meant they ſhould underſtand it to be his reſolution utterly to exterminate them; for the pine-tree, once cut down, ſhoots out again no more.

which

which is, on the contrary, in a vertical plane, opens at ſeven o'clock, and ſhuts at ten.

From a ſeries of ſimilar obſervations it was, that the celebrated *Linnæus* had formed a botanical time-piece; for he had found plants which opened their flowers at every hour of the day, and of the night. There is cultivated in the King's Garden, at Paris, a ſpecies of ſerpentine aloes, without prickles, whoſe large and beautiful flower exhales a ſtrong odour of the vanilla, during the time of it's expanſion, which is very ſhort. It does not blow till toward the month of July, and about five o'clock in the evening: You then perceive it gradually open it's petals, expand them, fade, and die. By ten o'clock of the ſame night, it is totally withered, to the great aſtoniſhment of the ſpectators, who flock in crowds to the ſight; for what is uncommon is alone admired. The flower of our common thorn, I do not mean that of the white-thorn, is ſtill more extraordinary; for it flowers ſo rapidly, that there is ſcarce time to obſerve it's expanſion.

Theſe obſervations, taken in their connection, clearly demonſtrate the relations of the corollæ to the heat of the Sun. To all thoſe which have gone before, I ſhall ſubjoin one more, by way of concluſion, which evidently proves the uſe for

which they are intended; it is this, The duration of their exiſtence is regulated by the quantity of heat which it is their deſtination to collect. The hotter it is, the ſhorter is their duration. They almoſt all drop off as ſoon as the plant is fecundated.

But if Nature withdraws the greateſt number of flowers from the too violent action of the Sun, ſhe deſtines others to appear in all the luſtre of his rays, without ſuſtaining the leaſt injury from them. On the firſt ſhe beſtows duſky reflectors, or ſuch as can cloſe themſelves as occaſion requires; ſhe provides others with paraſols. Such is the crown-imperial, whoſe flowers, like a bell inverted, grow under the ſhade of a tuft of leaves. The chryſanthemum-peruvianum, or to employ a better-known term, the turnſol, which turns continually toward the Sun, covers itſelf, like Peru, the country from which it comes, with dewy clouds, which cool and refreſh it's flowers, during the moſt violent heat of the day. The white flower of the lychnis, which blows in our fields, in Summer, and preſents, at a diſtance, the reſemblance of a Malteſe-croſs, has a ſpecies of contraction, or narrow collar, placed at it's centre, ſo that it's large ſhining petals turned back outwardly, do not act upon it's ſtamina. The white narciſſus has, in like manner, a ſmall tunnel. But Nature ſtands in no need to

create

create new parts, in order to communicate new characters to her Works. She deduces them, at once, from exiftence and from non-exiftence; and renders them pofitive, or negative, at her pleafure. She has given curves to moft flowers, for the purpofe of collecting the heat at their centre: fhe employs the fame curves, when fhe thinks proper, in order to diffipate the heat: fhe places the focufes of them fo as to act outwardly. It is thus that the petals of the lily are difpofed, which are fo many fections of the parabola. Notwithftanding the large fize and the whitenefs of it's cup, the more it expands, the more it difperfes the fervent heat of the Sun; and while, in the middle of Summer, at noon-day, all other flowers, parched by his burning rays, droop and bend their heads to the ground, the lily rears his head like a king, and contemplates, face to face, the dazzling orb, which is travelling majeftically through the Heavens.

I proceed to difplay, in a few words, the pofitive, or negative, relations of flowers, with refpect to the Sun, to the five elementary forms which I have laid down, in the preceding Study, as the principles of the harmony of bodies. This is not fo much a plan which I take upon me to prefcribe to Botanifts, as an invitation to engage in a career

reer ſo rich in obſervations, and to correct my errors by communicating ſome portion of their knowledge.

There are, therefore, reverberating flowers *perpendicular*, *conical*, *ſpherical*, *elliptical*, *parabolic*, *or plane*. To theſe curves may be referred moſt of the curves of flowers. There are, likewiſe, ſome flowers in form of a paraſol, but the others are much more numerous; for the negative effects, in every harmony, are in much greater number than the poſitive effects. For example, there is but one ſingle way of coming into life, and there are thouſands of going out of it. We ſhall oppoſe, however, to every poſitive relation of flowers to the Sun, a principal negative relation, that we may be enabled to compare their effects in every Latitude.

Perpendicular reverberating flowers are thoſe which grow adhering by the back to a cone, to long catkins, or to an ear: ſuch are thoſe of the cedar, of the larch, of the fir, of the birch, of the juniper; of moſt of the northern gramineous plants, of the vegetables of cold and lofty mountains, as the cypreſs and the pine; or of thoſe which flower in our climates about the end of Winter, as the hazel and the willow. A part of the

the flowers in this poſition is ſheltered from the North wind, and receives the reflection of the Sun from the South ſide.

It is remarkable that all vegetables which bear cones, catkins, or ſpikes, preſent them at the extremity of their ſtems, expoſed to all the action of the Sun. It is not ſo with thoſe which grow within the Tropics; moſt of which, ſuch as the palm-tree, bear divergent flowers, attached to pendent cluſters, and ſhaded by their branches. The greateſt part of the gramineous plants of warm countries, have likewiſe divergent ears; ſuch are the millets of Africa. The ſolid ear of the American maize is crowned with a hairy tuft which ſhelters it's flowers from the Sun. On the annexed plate are repreſented an ear of European corn, and an ear of the rice of ſouthern Aſia, to furniſh the means of compariſon.

Conical reverberating flowers reflect on the parts of floriſication a complete cone of light. It's action is very powerful; and it is, accordingly, very remarkable, that Nature has given this configuration of petal only to flowers which grow under the ſhade of trees, as to the convolvulus, which ſcrambles up around their trunk; and that ſhe has aſſigned to this flower a very tranſient duration, for it ſcarcely laſts half a day; and when it's fe-

 cundation

cundation is completed, the border contracts inwardly, and gathers together like a purſe. Nature has, however, given it a place in ſouthern latitudes, but ſhe has there tinged it with violet and blue, in order to weaken the effect. Beſides, this flower ſcarcely ever opens in hot countries, except in the night. From this nocturnal character, I preſume, it is, that we are chiefly enabled to diſtinguiſh the convolvulus of the South, from that of our own climates, which blows in the day-time. In the plate we have repreſented the day-convolvulus, or that which is native with us, expanded; and that of the night, or of hot countries, cloſed; the one having a poſitive character with the light, and the other a negative character.

The flowers which partake the moſt of this conical form are thoſe which grow early in the Spring, as the flower of the arum, which is formed like a cornet; or thoſe which thrive on lofty mountains, as the bears-ear of the Alps. When Nature employs it in Summer, it is almoſt always with negative characters, as in the flowers of the fox-glove, which are inclined, and dyed a deep red, or blue colour.

Spherical reverberating flowers, are thoſe whoſe petals are formed into ſegments of a circle. One might amuſe himſelf very agreeably, in obſerving that

that these ſpherically formed petals have, at their focuſes, the antheræ of the flower ſupported on fibrets, longer or ſhorter, as the effect intended may require. It deſerves farther to be remarked, that each petal is adapted to it's particular anthera, ſometimes to two, or even to three: ſo that the number of petals in a flower divides, almoſt always, exactly that of the antheræ. As to the petals, they ſcarcely ever exceed the number of five, in roſe-formed flowers, as if Nature had deſigned to expreſs, in that, the number of the five terms of elementary progreſſion, of which this beautiful form is the harmonic expreſſion.

Spherical reverberating flowers are very common in our temperate climates. They do not throw back the whole reflection of their diſks on the antheræ, like the convolvulus, but only the fifth part, becauſe each of their petals has it's particular focus. The roſe-formed flower is ſpread over moſt fruit-trees, as the apple, the pear, the peach, the plumb, the apricot, and the like; and over a great part of our ſhrubbery and herbage; ſuch as the black and white-thorn, the bramble, the anemone, and many others, moſt of which produce for Man a nutritious fruit, and which flower in the month of May. To this form may be likewiſe referred ſuch as are ſpheroïdal; the lily of the valley, for example.

This

This form, which is the harmonic expreſſion of the five elementary forms, was admirably adapted to a temperature like ours, which is itſelf the proportional medium between that of the Icy and of the Torrid Zone. As ſpherical reflectors collect a great quantity of rays at their focuſes, their action is very powerful, but, at the ſame time, of very tranſient duration. It is well known that nothing fades more quickly than a roſe.

Roſe-formed flowers are very rare between the Tropics, eſpecially thoſe whoſe petals are white. They thrive only under the ſhade of trees. I have known many of the inhabitants of the Iſle of France make fruitleſs efforts to raiſe ſtrawberries there; but one of them, who lived, indeed, in an elevated part of the Iſland, found means of procuring them in great plenty, by planting his beds under trees, in ground but half-cleared.

As a compenſation for this, Nature has multiplied, in warm countries, papilionaceous, or leguminous flowers. The leguminous flower is entirely oppoſite to the roſe-formed. It uſually has five rounded petals, like the other: but inſtead of being diſpoſed round the centre of the flower, in order to reverberate thither the rays of the Sun, they are, on the contrary, folded inward, around the antheræ, for the purpoſe of ſheltering them. You diſtinguiſh

diſtinguiſh in them, a pavilion, two wings, and a ridge, uſually divided into two, by which the antheræ and the embryon of the fruit are cloſely covered over. Between the Tropics, accordingly, a great number of trees, ſhrubs, creepers, and graſſes, have papilionaceous flowers. Every ſpecies of our peaſe and french-beans, ſucceed there wonderfully well, and thoſe countries produce infinite varieties of them. Nay, it is remarkable, that even at home, thoſe plants delight in a ſandy and warm ſoil, and exhibit their flowers in the middle of Summer. I conſider leguminous flowers, therefore, as of the paraſol kind. To thoſe ſame negative effects of the Sun may, likewiſe, be referred the form of flowers with gullets, which conceal their antheræ, ſuch as the calfs-ſnout, which takes pleaſure in blowing on the ſides of walls.

Elliptical reverberating flowers are thoſe which preſent oval-formed cups, narrower a-top than in the middle. It is very perceptible that this form of cup, the perpendicular petals of which approach toward each other at the ſummit, ſhelters, in part, the bottom of the flower: and that the curves of theſe ſame petals, which have ſeveral focuſes, do not collect the rays of the Sun toward one ſingle centre: ſuch is the tulip. It is remarkable, that this oblong-formed flower is more common

common in warm countries than the roſe-formed. The tulip grows ſpontaneouſly in the vicinity of Conſtantinople. To this form may likewiſe be referred that of the liliaceous, which are more common there than elſewhere. However, when Nature employs them in countries ſtill farther to the South, or in the middle of Summer, it is almoſt always with negative characters; thus, ſhe has inverted the tulip-form flowers of the imperial, which is originally from Perſia, and has ſhaded them with a tuft of foliage. Thus, ſhe bends back outwardly, in our climates, the petals of the lily; but the ſpecies of white lilies which grow between the tropics, have, beſides, their petals cut out into thongs.

Flowers with PARABOLIC, or PLANE, mirrors, are thoſe which reflect the rays of the Sun in parallel directions. The configuration of the firſt gives much luſtre to the corolla of theſe flowers, which emit from their boſom, if I may be allowed the expreſſion, a bundle of light, for they collect it toward the bottom of their corolla, and not on the antheræ. It is, perhaps, in order to weaken the action of it, that Nature has terminated flowers of this form in a ſpecies of cowl, which Botaniſts call ſpur. It is probably in this tube that the focus of their parabola terminates, which is, perhaps, ſituated there, as in many curves of this kind, beyond

beyond it's ſummit. Flowers of this ſort are frequent between the Tropics; ſuch is the flower of the *poincillade* of the Antilles, otherwiſe called the peacock-flower, on account of it's beauty; ſuch is alſo the *naſturtium*, or nun of Peru. It is even pretended that the perennial ſpecies is phoſphoric in the night-time.

Flowers with plane mirrors produce the ſame effects; and Nature has multiplied the models of them in our Summer flowers, and in thoſe which thrive in warm and ſandy ſoils, as the radiated; ſuch are the flowers of the dandelion. We likewiſe meet with them in the flowers of the *doronicum*, of the lettuce, of the ſuccory; in the aſters, in the meadow daiſy, and others. But ſhe has placed the original model of them under the Line, in America, in the broad Sun-flower, which we have borrowed from Braſil.

Theſe being flowers whoſe petals have the leaſt activity, are likewiſe thoſe which are of the longeſt duration. Their attitudes are varied without end. Such as are horizontal, like thoſe of the dandelion, cloſe, it is ſaid, toward the middle of the day; they are, likewiſe, ſuch as are the moſt expoſed to the action of the Sun, for they receive his rays from his riſing to his ſetting.

There

There are others which, inftead of clofing their petals, invert them, which produces nearly the fame effect; fuch is the flower of the camomile. Others are perpendicular to the Horizon, as the flower of Lettuce. The blue colour, with which it is tinged, contributes, farther, towards weakening the rays of the Sun, which, in this afpect, would act too vehemently upon it. Others have only four horizontal petals; fuch as the cruci-form; the fpecies of which are very common in hot countries. Others bear, around their difk, flowrets which overfhadow it; fuch is the blue-bottle of the corn-field, which is reprefented on the plate in oppofition to the daify. This laft flowers early in the Spring, and the other in the middle of Summer.

We have faid fomewhat of the general forms of flowers, but we fhould never come to a conclufion, were we to enter into a difcuffion of their various aggregations. I believe, however, that they may be referred to the plan itfelf of the flowers. Thus the umbelliferous flowers prefent themfelves to the Sun under the fame afpects as the radiated.

I muft beg leave to recapitulate only what has been faid refpecting their reflecting mirrors. The

reverberated

reverberated perpendicular, of a cone or ear form, collects on the antheræ of the flowers, an arch of light of ninety degrees, from the Zenith to the Horizon. It farther presents, in the inequality of it's panels, reflecting surfaces.

The conical reflector collects a cone of light of sixty degrees. The spherical reflector unites, in each of it's five petals, an arch of light of thirty-six degrees of the Sun's course, supposing that Luminary to be in the Equator.

The elliptical reflector collects a smaller quantity, from the perpendicular position of it's petals; and the parabolic reflector, as well as that with plane mirrors, sends back the rays of the Sun divergently, or in parallels.

The first form appears to be very common in the flowers of the icy Zones; the second, in those which thrive under the shade; the third, in temperate latitudes; the fourth, in warm countries; and the fifth, in the Torrid Zone. It would likewise appear, that Nature multiplies the divisions of their petals, in order to diminish their action. Cones and ears have no petals. The convolvulus has but one; rose-formed flowers have five; elliptical flowers, as the tulip and the liliaceous, have six;

ſix; flowers with plane reflectors, as the radiated, have a great number.

Farther, flowers have parts adapted to the other elements. Some are clothed externally with a hairy garment, to ſhelter them from the cold. Others are formed to blow on the ſurface of the water; ſuch are the yellow roſes of the nymphæa, which float on lakes, and accommodate themſelves to the various movements of the waves, without being wet by them, by means of the long and pliant ſtems to which they are attached. Thoſe of the *valiſneria* are ſtill more artfully diſpoſed. They grow in the Rhone, and would be there expoſed to frequent inundation by the ſudden ſwellings of that river, had not Nature given them ſtems formed lik a cork-ſcrew, which draw out at once to the length of three or four feet.

There are other flowers adapted to the winds and to the rains, as thoſe of peaſe, which are furniſhed with little boats to cover and ſhelter the ſtamina, and the embryons of their fruits *. Beſides,

* I am perſuaded, that the bearing of moſt flowers is adapted to the rains, and for this reaſon it is that many of them have the form of mufflers, or ridges, like little boats inverted, which ſhelter the parts of fecundation. I have remarked that many ſpecies

ſides, they have large pavilions, and reſt on tails bent and elaſtic, as a nerve; ſo that when the wind blows over a field of peaſe, you may ſee all the flowers turn their back to the wind, like ſo many weather-cocks.

This claſs appears to be very generally diffuſed over places much expoſed to the winds. *Dampier* relates, that he found the deſert ſhores of New-Guinea covered with peaſe, whoſe bloſſoms were red and blue. In our climates, the fern, which crowns the ſummits of hills always battered with the wind and the rain, bears it's flower turned toward the Earth, on the back of it's leaves. There are even certain ſpecies of plants, the flowering of which is regulated by the irregularity of the winds. Such are thoſe, the male and female individuals of which grow on ſeparate ſtems. Toſſed hither and thither over the earth, frequently at great diſtances from each other, the powder of the male flowers could fecundate but a very few fe-

ſpecies of flowers poſſeſs the inſtinct, ſhall I venture to call it? of cloſing themſelves when the air is humid, and that the impregnation of fruit-tree bloſſoms is injured much more by the rain than by the froſt. This obſervation is of eſſential importance to gardeners, who frequently cauſe the flowers of their ſtrawberry plants to miſcarry by watering them. As far as I can judge, it would be better to water plants, in bloſſom, by little trenches, according to the Indian method, rather than by aſperſion.

male

male flowers, unlefs, at the feafon of their florification, the wind blew from various quarters. Wonderful to be told! There are invariable generations depending on the variablenefs of the wind. Hence I prefume, that in countries where the winds always blow from the fame quarter, as between the Tropics, this fpecies of florification muft be uncommon; and if it be found there at all, it muft be regulated precifely according to the feafon when thofe regular winds vary.

It is impoffible to entertain a doubt refpecting thofe admirable relations, however remote they may appear, when we obferve the attention with which Nature has preferved flowers from the fhocks to which they might be expofed, from the winds themfelves, upon their ftems. She inwraps them, for the moft part, in an integument, which Botanifts call the *calix*. The more ramous the plant is, the thicker is the calix of it's flower. She fometimes fringes it with little cufhions and beards, as may be feen in the rofe-bud. Thus the mother puts a pad round the head of her little child, to fecure it againft accidents from falling. Nature has fo clearly marked her intention as to this, in the cafe of the flowers of ramous plants, that fhe has deprived of this clothing fuch as grow on ftems that are not branchy, and where they are in no danger from the agitation of the winds. This may

may be remarked with regard to the flowers of Solomon's ſeal, of the lily of the valley, of the hyacinth, of the narciſſus, of moſt of the liliaceous, and of plants which bear their flowers iſolated, on perpendicular ſtems.

Flowers have, farther, very curious relations with animals and with Man, from the diverſity of their configurations, and from their ſmells. Thoſe of one ſpecies of the orchis repreſent bugs, and exhales the ſame unpleaſant odour. Thoſe of a ſpecies of the arum reſembles putrid fleſh, and has the infection of it to ſuch a degree, that the fleſh-fly reſorts thither to depoſit her eggs. But thoſe relations, hitherto very ſuperficially inveſtigated, do not come in ſo properly under this article; it is ſufficient for me to have here demonſtrated, that they actually have very clearly marked relations with the elements, and eſpecially with the Sun.

When Botaniſts ſhall have diffuſed over this branch of the ſubject all the light of which it is ſuſceptible, by examining their focuſes, the elevation to which they riſe above the ground, the ſhelter, or the reflection of the bodies which are in their vicinity, the variety of their colours, in a word, all the means by which Nature compenſates the differences of their ſeveral expoſures, and they will no longer doubt about thoſe elementary har-

 monies;

monies; they will acknowledge that the flower, far from preſenting an unvarying character in plants, exhibits, on the contrary, a perpetual character of diverſity. It is by this, principally, that Nature varies the ſpecies in the ſame genus of plant, in order to render it ſuſceptible of fecundation, on different ſites. This explains the reaſon why the flowers of the great cheſtnut of India, but originally from America, are not the ſame with thoſe of the European cheſtnut; and that thoſe of the fullers-thiſtle, which thrives on the brink of rivers, are different from thoſe of thiſtles, which grow in lofty and dry places.

A very extraordinary obſervation ſhall ſerve irrefragably to confirm all that we have juſt now advanced: it is this, that a plant ſometimes totally changes the form of it's flowers in the generation which reproduces it. This phenomenon greatly aſtoniſhed the celebrated *Linnæus*, the firſt time that it was ſubmitted to his conſideration. One of his pupils brought him, one day, a plant perfectly ſimilar to the linarium, the flower excepted; the colour, the ſavour, the leaves, the ſtem, the root, the calix, the pericarpium, the ſeed, in a word, the ſmell, which is a remarkable circumſtance, were exactly the ſame, only it's flowers were in form of a tunnel, whereas thoſe of the linarium are gullet-formed. *Linnæus* imagined, at firſt,

first, that his pupil intended to put his knowledge to the test, by adapting a strange flower to the stem of that plant; but he satisfied himself that it was a real linarium, the flower of which Nature had totally changed. It had been found among other linaria, in an island, seven miles distant from Upsal, near the shore of the sea, on a sandy and gravelly bottom. He himself put it to the proof, that it re-perpetuated itself in this new state by it's seeds. He afterwards found some of it in other places: and, what is still more extraordinary, there were among these last, some which carried on the same stalk flowers tunnel-formed, and flowers gullet-formed.

He gave to this new vegetable the name of *pelorum*, from the Greek word πέλωρ, which signifies prodigy. He afterwards observed the same variations in other species of plants, and among the rest, in the eriocephalous thistle, the seeds of which produce, every year, in the garden of Upsal, the fantastic thistle of the Pyrennées *. This illustrious Botanist accounts for these transformations, as being the effect of a mongrel generation, disturbed by the fecundating farina of some other flower in the vicinity. It may be so; to his opi-

* Upsalian Dissertation, for December, 1744; page 59, note 6.

nion, however, may be oppoſed, the flowers of the pelorum, and of the linarium, which he found united on the ſame individual. Had it been the fecundation which transformed this plant, it ought to have given ſimilar flowers in the whole individual. Beſides, he himſelf has obſerved, that there was not the ſlighteſt confuſion in the other parts of the pelorum, any more than in it's virtues; but this muſt have been the caſe, as well as in the flower, had it been produced by a mixture of ſome ſtrange breed. Finally, the pelorum reproduced itſelf by ſeed, which does not take place in any one mongrel ſpecies of animals.

This ſterility, in mongrel branches, is an effect of the ſage conſiſtency of Nature, who cuts off divergent generations, in order to prevent the primordial ſpecies from being confounded, and from, at length, diſappearing altogether. As to the reſt, I pry neither into the cauſes, nor the means, which ſhe is pleaſed to conceal from me, becauſe they far tranſcend my comprehenſion. I confine my enquiries to the ends which ſhe kindly unfolds; I confirm myſelf in the belief, from the variety of flowers in the ſame ſpecies, and ſometimes in the ſame individual, that they ſerve, in certain caſes, as reflectors to vegetables, for the purpoſe of collecting, conformably to their poſition, the rays of the

the Sun on the parts of fecundation; and, in other cases, as parasols, to put them under cover from excessive heat.

Nature deals by them, nearly, as she does by animals which are exposed to the same variations of Latitude. In Africa, she strips the sheep of the woolly fleece, and gives her sleek smooth hair, like that of the horse: and to the North, on the contrary, she clothes the horse with the shaggy fur of the sheep. I have been an eye-witness of this double metamorphosis, at the Cape of Good-Hope and in Russia. I have seen at Petersburg, Norman and Neapolitan horses, whose hair, naturally short, was so long and so frizzled, in the middle of Winter, that you would have believed them covered with wool like sheep. It is not without reason, therefore, that the ancient proverb says. GOD *tempers the wind to the shorn lamb*: and when I behold his paternal hand varying the fur of animals conformably to the degree of heat and cold, I can easily believe, that it varies, in like manner, the mirrors of flowers conformably to the Sun. Flowers, then, may be divided, with relation to the Sun, into two classes: into reverberating flowers, and flowers in form of a parasol.

If there be any constant character in plants, we must look for it in the fruit. It is thitherward

 that

that Nature has directed all the parts of vegetation, as to the principal object. That ſaying of WISDOM itſelf, *by their fruits ye ſhall know them*, is, at leaſt, as applicable to plants as to the human ſpecies.

We ſhall examine, therefore, the general characters of plants, with relation to the places where their ſeeds are accuſtomed to grow. As the animal kingdom is divided into three great claſſes, quadrupeds, volatiles, and aquatics, relatively to the three elements of the Globe; we ſhall, in like manner, divide the vegetable kingdom into aërial or mountain-plants; into aquatics, or thoſe of the ſhores; and into terreſtrial, or thoſe of the plains. But as this laſt participates of the two others, we ſhall not dwell upon it; for, though I am perſuaded that every ſpecies, nay, that every variety, may be referred to ſome particular ſite of the earth, and may grow there in it's higheſt degree of beauty, it is ſufficient to ſay as much of it here as may be neceſſary to the proſperity of a ſmall garden. When we ſhall have traced invariable characters, in the two extremities of the vegetable kingdom, it will be eaſy to refer to the intermediate claſſes, thoſe which are adapted to them. We ſhall begin with the plants of the mountains.

Elementary

Elementary Harmonies of Plants with the Water and the Air, by Means of their Leaves and their Fruits.

When the AUTHOR of Nature deſigned to clothe with vegetables even the higheſt and ſteepeſt pinnacles of the Earth, He firſt adapted the chains of mountains to the baſons of the ſeas which were to ſupply them with vapours; to the courſe of the winds which were to waft them thither, and to the different aſpects of the Sun by which they were to be heated. As ſoon as theſe harmonies were eſtabliſhed between the elements, the clouds aſcended out of the Ocean, and diſperſed themſelves over the moſt remote parts of the Continents. There they diſtilled, under a thouſand different forms, in fogs, in miſts, in dews, in rains, in ſnows. They deſcended from the heights of the Atmoſphere in every poſſible variety of manner; ſome in a tranquil air, ſuch as our Spring ſhowers, came down in perpendicular drops, as if they had been ſtrained through a ſieve; others, driven by the furious winds, beat horizontally on the ſides of the mountains; others fell in torrents, like thoſe which, for nine months of the year, inundate the Iſland of Gorgona, placed in the heart of the Torrid Zone, in the burning Gulf of Panama. There were ſome which accumulated

themſelves, in mountains of ſnow, on the inacceſſible ſummits of the Andes, to cool, by their effuſions, the Continent of South-America, and, by their icy Atmoſphere, the vaſt expanſe of the Pacific Ocean. In a word, mighty rivers flowed over regions where the rain never deſcends, and the Nile watered the plains of Egypt.

Then GOD ſaid: "Let the Earth bring forth "graſs, the herb yielding ſeed, and the fruit-tree "yielding fruit after his kind, whoſe ſeed is in itſelf "upon the Earth." At the voice of the All-Mighty, the vegetables appeared with organs perfectly fitted to collect the bleſſings of Heaven. The elm aroſe on the mountains which ſkirt the Tanaïs, clothed with leaves in form of a tongue; the tufted box ſtarted from the brow of the Alps; and the prickly caper-tree from the rocks of Africa, with leaves hollowed into ſpoons. The pines on the ſandy Norwegian hills attracted the vapours which were floating in the air, with their ſlim foliage, diſpoſed like a Painter's pencil; the verbaſcum diſplayed it's broad leaves on the parched ſand, and the fern preſented, on the hill, it's fan-like foliage to the rainy and horizontal winds. A multitude of other plants, from the boſom of the rocks, from ſtrata of flint, nay, even from marble incruſtations, drunk in the waters of Heaven by cornets, by ſandals, and by cruets. From the cedar of

of Lebanon down to the violet which perfumes the grove, there was not one but what presented it's large goblet, or it's tiny cup, conformably to it's neceſſity, or it's ſtation.

This adaptation of the leaves of plants, in elevated ſituations, for receiving the deſcending diſtillations of the rain, is varied without end; but the character of it is diſcernible in moſt, not only in their concave forms, but likewiſe in a little canal, ſcooped out on the pedicle by which they are attached to their branches. It has ſomething of a reſemblance to that which Nature has traced on the upper lip of Man, to receive the humours which deſcend from the brain. It is particularly perceptible on the leaves of artichokes, which, being of the nature of thiſtles, agree with dry and ſandy ſituations. Theſe have, beſides, collateral awnings to prevent the loſs of any of the water that falls from Heaven. Plants which grow in places very hot, and very parched, ſometimes have their ſtems or their leaves transformed entirely into a canal. Such are the aloes of the iſland of Zocotara, in the mouth of the Red-Sea, or the prickly taper of the Torrid Zone. The aqueduct of the aloes is horizontal, and that of the taper perpendicular.

What

What has prevented Botanifts from remarking the relations which the leaves of plants have with the waters that feed and refrefh them, is their feeing them every where nearly of the fame form, in the valleys, as on the heights; but though mountain-plants prefent foliages of every kind of configuration, you may eafily difcern, from their aggregation in form of pencils, or fans, from the gatherings of the leaves, or other equivalent figns, that they are deftined to receive the rain water, but chiefly from the aqueduct which I have juft mentioned. This aqueduct is traced on the pedicle of the fmalleft leaves of mountain-plants; by means of it, Nature has rendered the forms themfelves of aquatic-plants fufceptible of vegetation in the moft parched fituations.

The bulrufh, for example, which is only a round and full ftraw, that grows by the water-fide, did not appear fufceptible of collecting any humidity in the air, though it is very well fuited to lofty fituations, from it's capillaceous form, which, like that of gramineous plants prefents nothing to the wind to lay hold of. In fact, if you confider the different fpecies of rufh which clothe the mountains in many parts of the world, fuch as that called *icho*, on the lofty mountains of Peru, the only vegetable almoft that grows there, and thofe which thrive with ourfelves in dry fands, or on heights, you

you would, at the first glance, believe them similar to the rush of marshy places; but with a little attention, and not without astonishment, you will observe that they are hollowed into a furrow the whole of their lengthwise direction. They are, like other rushes, convex on one side, but they differ from them essentially, in that they are all concave on the other; I was enabled to distinguish, by this same character, the spartha, which is a rush of the mountains of Spain, and is now frequently manufactured at Paris into cordage for their draw-wells.

Many leaves, even of the plants of the plains, assume, on their first springing up, this form of little furrow, or spoon, as those of the violet, and of most gramineous plants. You may perceive, in the Spring, the young tufts of these raising themselves upright toward Heaven, like paws, to catch the falling drops, especially when it begins to rain; but most plants of the plains lose their gutter as they expand. It has been bestowed on them only during the season when it was necessary to their growth. It is permanent only in the plants of the mountains. It is traced, as has been mentioned, on the pedicle of the leaves, and conducts the rain-water into the tree, from the leaf to the branch: the branch, by the obliquity of it's position, conveys it to the trunk, from whence it

descends to the root, by a series of successive dispositions. If you pour water gently over the leaves of a mountain-shrub, which are the farthest from it's stem, and you will perceive it pursue the progress which I have just indicated, and not a single drop will be lost on the ground.

I have had the curiosity to measure, in some mountain-plants, the inclination which their branches form with their stem; and I have found, in at least a dozen of different species, as in the fern, the thuia, and the like, an angle of about thirty degrees. It is very remarkable, that this degree of incidence is the same with that which is formed, in a flat country, by the course of many rivulets and smaller rivers, with the great rivers into which they discharge themselves, as may be ascertained by reference to maps. This degree of incidence appears to be the most favourable to the efflux of many fluids, which direct themselves toward one single line. The same Wisdom has regulated the level of the branches in trees, and the course of the stream through the plains.

This inclination undergoes some varieties in certain mountain-trees. The cedar of Lebanon, for example, sends forth the lower parts of it's branches, in an upward direction, toward Heaven, and lowers their extremities, by bending them downward

downward to the Earth. They have the attitude of command which is ſuited to the king of vegetables, that of an arm raiſed up into the air, with the hand gently inclining. By means of the firſt diſpoſition, the rain-water is conveyed along the ſloping branch to the trunk; and by the ſecond, the ſnows, in the regions of which it takes delight to dwell, ſlide away from off it's foliage. It's cones have, in like manner, two different attitudes; for it inclines them, at firſt, toward the Earth, to ſhelter them at the ſeaſon of their flowering; but when they are fecundated, it erects them toward Heaven. The truth of theſe obſervations may be confirmed by referring to a young and beautiful cedar in the Royal Garden, which, though a ſtranger, has preſerved, in the midſt of our climate, the air of a King, and the majeſtic port of Lebanon.

The bark of moſt mountain-trees is equally adapted for conducting the rain-water from the branches to the roots. That of the pine is in large perpendicular ribs; that of the elm is cleft and chinked longitudinally; that of the cypreſs is ſpongy, like the coat of flax.

The plants of mountains, and of dry grounds, have a farther character, which is, in general, peculiar to them: it is that of attracting the water which

which floats in the air, in imperceptible vapours. The parietaria (pellitory) which has derived it's name from the Latin word *pariete*, (wall) becauſe it grows on the ſides of walls, has it's leaves almoſt always in a humid ſtate. This attraction is common to moſt trees of the mountains. Travellers unanimouſly aſſure us, that there is, in the mountains of the Iſland of Ferro, a tree, which furniſhes every day, to that iſland, a prodigious quantity of water. The iſlanders call it *garoé*, and the Spaniards *ſanto*, from it's ſingular utility. They tell us it is always ſurrounded with a cloud, which diſtils copiouſly along it's leaves, and fills with water the large reſervoirs which are conſtructed at the root of this tree, affording an abundant ſupply for the iſland.

This effect is, perhaps, ſomewhat exaggerated, though related, in nearly the ſame terms, by perſons of different Nations: but I give full credit to the general fact. The real caſe I take to be this, it is the mountain which attracts from afar the vapours of the Atmoſphere, and that the tree, ſituated in the focus of attraction, collects them around it.

Having frequently ſpoken, in the courſe of this Work, of the attraction of the ſummits of many mountains, the Reader, perhaps, will not be diſpleaſed,

pleased, if I present to him, in this place, an idea of that branch of the hydraulic architecture of Nature. Among a great number of curious examples, which I might produce to this purpose, and which I have collected, as an addition to my materials on the subject of Geography, I beg leave to present one, which I have extracted, not from a systematic Philosopher, but from a simple and unaffectedly sprightly traveller of the last age, who relates things as he saw them, and without pretending to deduce consequences of any kind whatever. It is a description of the summits of the Island of Bourbon, situated in the Indian Ocean, extending to the twenty-first degree of South Latitude. It is copied from the writings of M. *de Villers*, who was then Governor of that island, under the East-India Company. It is published in the journals of the first voyages made by our French Navigators into *Arabia-Felix*, about the year 1709, and given to the World by M. *de la Roque*. See that Work, page 201.

"Of those plains," says M. *de Villers*, which are upon the mountains (of Bourbon), "the most "remarkable, though no account has hitherto "been given of it, is that to which they have "given the name of the Plain of the Cafres, from "a tribe of that People, slaves to the inhabitants "of the Island, who went thither to conceal them- "selves,

" ſelves, after they had run away from their maſ-
" ters. From the ſhore of the ſea, you riſe by a
" gentle aſcent, for ſeven leagues together, in or-
" der to reach this plain, by the ſingle path that
" leads to it, along the river of Saint Stephen: it is
" poſſible, however, to ride up on horſeback. The
" ſoil is good and ſmooth to about a league and a
" half, on this ſide the plain, planted with large and
" beautiful trees, the foliage of which, as it falls,
" ſerves for food to the tortoiſes, which are to be
" found there in great numbers.

" The height of this plain may be eſtimated
" at two leagues above the Horizon; it accord-
" ingly appears from below to be quite loſt in the
" clouds. It's circumference may be about four
" or five leagues. The cold is there inſupport-
" able, and *a continual fog, which wets as much as*
" *rain*, prevents your ſeeing objects ten paces diſ-
" tant; as it falls in the night, you may ſee
" through it more clearly than by day: but then
" it freezes dreadfully, and in the morning, before
" ſun riſe, the plain is frozen all over.

" But what ſtrikes the eye of the beholder as
" very extraordinary, are certain elevations of
" ground, cut out almoſt in form of round co-
" lumns, and of a prodigious height; for they
" cannot be much lower than the turrets of Notre-
" Dame

" Dame at Paris. They are put down like pins
" on the ſkittle-ground, and the reſemblance is
" ſo ſtrong, that you may eaſily miſtake on reck-
" oning them: they go by the name of *pitons*
" (pins). If you wiſh to ſtop by one of thoſe
" eminences to take reſt, ſuch of your company as
" are not inclined to repoſe, but want to go for-
" ward, muſt not withdraw ſo much as two hun-
" dred paces, otherwiſe they will be in great dan-
" ger of not finding again the point of ſeparation,
" theſe pins are ſo many in number, all ſimilar
" in form, and ſo much arranged in the ſame
" manner, that the Creoles, who are native there,
" are themſelves liable to miſtake.

" For this reaſon it is, that, in order to prevent
" the unpleaſant conſequences of ſuch an error,
" when a company of travellers take ſtation at
" one of the pins, if any are diſpoſed to make a
" farther excurſion, they leave a perſon at the
" place of rendezvous, to make a fire, or raiſe a
" ſmoke, which may ſerve to direct, and bring
" back the ſtrayers; and if the *fog* be *ſo thick*,
" which is frequently the caſe, as to hinder the fire,
" or the ſmoke from being ſeen, they provide
" themſelves with a kind of large ſhells, one of
" which is left with him who keeps ſtation at the
" pin; another is carried off by the ſeparating
" party; and when they wiſh to return, ſome one

"blows violently into the ſhell, as into a trumpet, " which emits a very ſhrill ſound, and capable of " being heard at a great diſtance; this is anſwered " by the other, and being repeated as often as is " neceſſary, they are eaſily recovered from ſtray- " ing, and collected at the point of departure. " Without ſuch precautions, the traveller might " be bewildered.

" In this plain are many aſpin-trees, and they " are always green. Other trees are covered " with a moſs of more than a fathom in length " around their trunk and large branches. They " are withered, without foliage, and ſo impreg- " nated with moiſture, that it is impoſſible to " make them take fire. If, with much difficulty, " you are able to kindle ſome of the ſmaller " boughs, it is only a dark fire without flame, " which emits a reddiſh ſmoke, that defiles the " meat inſtead of roaſting it. You can hardly " find a ſpot in this plain on which to kindle a " fire, unleſs by looking about for ſome ſmall ele- " vation round the peaks; for the ſoil of the plain " is ſo humid, that the water every where ſpouts " out, ſo that you are continually in mud, and " moiſtened up to the calf of the leg. Great " numbers of blue birds are to be ſeen there neſt- " ling in the herbage, and among the aquatic " ferns. This plain was unknown before the de-

" ſertion

"ſertion of the Cafres. In order to get down, "you muſt return by the ſame way that you "aſcended, unleſs you chooſe to run the riſk of "another path, which is very rough, and dange-"rouſly ſteep.

"From the plain of the Cafres may be ſeen the "mountain known by the name of *Trois Salaſes*, "from the three points of that rock, the loftieſt "in the Iſland of Bourbon. All it's rivers iſſue "from thence, and it is ſo ſteep on every ſide, that "there is no poſſibility of climbing it.

"There is, beſides, in this iſland, another plain, "called the Plain of Silaos, higher than that of "the Cafres, and of no greater value: it is ex-"tremely difficult to get up to it."

In the lively deſcription of our Traveller, we muſt overlook ſome errors in Phyſics, ſuch as his aſſigning to the Plain of the Cafres an elevation of two leagues above the Horizon. He had not learned from the barometer and thermometer, that there is no ſuch elevation on the face of the Globe, and that, at the perpendicular height of one league only, the freezing point is invariable. But from the thick fog which ſurrounds thoſe peaks, from that continual miſt which wets as much as rain, and which falls during the night, it is evidently

 perceptible,

perceptible, that they attract to them the vapours, which the Sun raiſes out of the Sea in the day-time, and which diſappear in the night. Hence is formed that ſheet of water which inundates the Plain of the Cafres, and from which moſt of the brooks and rivulets that water the iſland take their riſe. You may equally diſtinguiſh a vegetable attraction in thoſe ever-green aſpins, and thoſe other trees, at all times humid, which it is impoſſible to kindle into flame.

The Iſland of Bourbon is almoſt round, and riſes out of the Sea in the ſhape of half an Orange. On the higheſt part of this hemiſphere are ſituated the Plains of Silaos and of the Cafres, where Nature has placed thoſe labyrinths of peaks continually involved in fogs, planted like nine-pins, and elevated like ſo many turrets.

Did time and room permit, I could make it evident, that there are a multitude of ſimilar peaks on the chains of lofty mountains, of the Cordeliers, of Taurus, and others, and at the centre of moſt iſlands, without admitting the poſſibility of ſuppoſing, though the opinion be current, that they are the remains of a primitive Earth raiſed to that height; for what muſt have become, as has been already demanded, of the wreck of that Earth, the pretended teſtimonies of which ariſe on every hand

hand over the ſurface of the Globe? I could demonſtrate that they are placed in aggregations, and in ſituations adapted to the neceſſities of the countries of which they are, in ſome ſenſe, the reſervoirs; ſome in a labyrinth, as thoſe of the Iſland of Bourbon, when they are on the ſummit of a hemiſphere, from whence they are deſtined to diſtribute the waters of Heaven in every direction; others in form of a comb, when they are placed on the extended creſt of a chain of mountains, as the pointed peaks of the chain of Taurus and of the Cordeliers; others grouped into pairs, into threes, according to the configuration of the territory which they are to water. They are of many forms, and of different conſtructions: ſome of them are incruſtations of earth, as thoſe of the Plain of the Cafres, and of ſome of the Antilles Iſlands, and which are beſides ſo ſteep, as to be entirely inacceſſible. Thoſe incruſtations of earth demonſtrate, that they have, at once, foſſil and hydraulic attractions.

There are others which preſent long needles of ſolid and naked rock; others are of a conical form; others are flattened as a table, ſuch as that of Table-mountain, at the Cape of Good-Hope, where you may frequently ſee the clouds accumulate, and ſpread like a table-cloth. Some are not apparent, but entirely involved in the ſide of

mountains, or in the boſom of plains. They are all diſtinguiſhable by the fogs which they attract around them, and by the ſources which emit their ſtreams in the vicinity. Nay, you may reſt aſſured, that there is no ſource but in the neighbourhood of ſome quarry of hydro-attractive, and, for the moſt part, of metallic ſtone. I aſcribe the attraction of thoſe peaks to the vitreous and metallic bodies of which they are compoſed: and I am perſuaded it might be poſſible to imitate this architecture of Nature, and to form, by means of the attraction of ſuch ſtones, fountains of water in the moſt parched ſituations. In general, vitreous bodies, and ſtones ſuſceptible of poliſh, are very proper for this purpoſe; for it is obſervable, that when water is diffuſed in great quantities through the air, as at the time of a general thaw, it is firſt attracted, and attaches itſelf, to the glaſs-windows and the poliſhed ſtones of our houſes.

I have frequently ſeen on the ſummit of the mountains, in the Iſle of France, effects ſimilar to thoſe of the peaks of the Plain of the Cafres, in the Iſland of Bourbon. The clouds collect there inceſſantly around their peaks, which are ſteep and pointed, like pyramids. Some of thoſe peaks terminate in a rock of a cubical form, which crowns them like a chapiter. Such is that one which they call *Piterbooth*, after the name of a Dutch

Dutch Admiral; it is one of the loftieſt in the Iſland.

Thoſe peaks are formed of ſolid rock, vitrifiable, and mixed with copper: they are real electrical needles, both in form and ſubſtance. The clouds perceptibly deviate from their courſe to collect upon them, and there accumulate, ſometimes to ſuch a degree, that the pinnacles become totally inviſible. They thence deſcend into the cavity of the vallies, along the declivities of the foreſts, which likewiſe attract them, and there diſſolve into rain, frequently forming rainbows on the verdure of the trees. This vegetable attraction, of the foreſts of that iſland, is in ſuch perfect harmony with the metallic attraction of the peaks of it's mountains, that a field ſituated in an open place, in their vicinity, very often ſuffers for want of rain, whereas it rains almoſt the whole year round in the woods, which are not above a gun-ſhot diſtant. It was by the deſtruction of part of the trees that clothed the heights of the iſland, that moſt of the brooks which watered it have been dried up: and now nothing remains of them but the empty channel.

To the ſame injudicious management, I aſcribe the ſenſible diminution of a conſiderable part of the rivers of Europe, both great and ſmall; as is

 evident

evident from a ſimple inſpection of their ancient bed, which is much broader and deeper than the maſs of water at this day tranſmitted by them to the Ocean. Nay, I am perſuaded, that to this cauſe we muſt aſcribe the dryneſs of the more elevated provinces of Aſia, thoſe of Perſia, in particular, the mountains of which have, no doubt, been injudiciouſly ſtripped of their trees, by the firſt tribes who inhabited them. I am decidedly of opinion, that were we to plant in France mountain-loving trees, on the high grounds, and at the ſources of our rivers, their ancient volume of water might be reſtored, and many rivulets might be made to re-aſſume their current through our plains, though they have long ſince ceaſed to flow. It is neither among the reeds, nor in the depth of the valley, that the Naïads conceal their exhauſtleſs urns, as Painters repreſent them, but at the ſummit of rocks crowned with wood, and towering to the Heavens.

There is not a ſingle vegetable, the leaf of which is diſpoſed to receive the rain-water on the mountains, whoſe ſeed is not formed in a manner the beſt adapted to raiſe itſelf thither. The ſeeds of all mountain-plants are volatile. By inſpecting their leaves, it is poſſible to aſcertain the character of their grains, and by inſpecting the grains, that of their leaves, and thence to infer the elementary character

character of the plant. By mountain-plants, I here wiſh to be underſtood to mean all thoſe which grow in ſandy and parched ſituations, on hillocks, in rocks, on ſteep ridges by the highway's ſide, in walls, and, in one word, at a diſtance from water.

The ſeeds of thiſtles, of blue-bottles, of dandelion, of ſuccory, and many others, are furniſhed with pinions, with plumes, with tufts, and various other means of riſing, which convey them to prodigious diſtances. Thoſe of the graſſes, which likewiſe travel very far, are provided with a light chaffy coat, and with bearded huſks. Others, ſuch as thoſe of the yellow gilly-flower, are cut into thin ſcales, and fly by the ſlighteſt breath of the wind, and plant themſelves in the moſt inconſiderable crevice of a wall. The ſeeds of the largeſt mountain-trees are no leſs volatile. That of the maple has two membranous pinions, ſimilar to the wings of a fly. That of the elm is caſed in the midſt of an oval thin leaf. Thoſe of the cypreſs are almoſt imperceptible. Thoſe of the cedar are terminated by broad and thin plates, which, in their aggregated ſtate, compoſe a cone. The grains are in the centre of the cone; and when arrived at maturity, the thin membranes, to which they adhere, ſeparate from each other, like the

cards

cards in a pack, and each of them flies off with it's own little kernel. (*See the annexed Plate.*)

The ſeeds of mountain-plants, which appear too heavy for flying, are furniſhed with other reſources. The peaſe of the balſamine have pods whoſe elaſticity darts them to a conſiderable diſtance. There is likewiſe a tree in India, the name of which I do not now recollect, that, in like manner, diſcharges it's ſeeds with a noiſe like that of a muſket fired off. Thoſe which have neither tufts, nor pinions, nor ſprings, and which, from their weight, ſeem condemned to remain at the foot of the vegetable which produced them, are, in very many caſes, thoſe which travel the fartheſt. They fly off with the wings of a bird. It is thus that a multitude of berries and ſhell-fruits re-ſow themſelves. Their ſeeds are incloſed in ſtony incruſtations, not capable of being digeſted. They are ſwallowed by the birds, which carry them off, and plant them in the cornices of towers, in the clefts of rocks, on the trunks of trees, beyond rivers, nay, beyond oceans. By ſuch means it was that a bird of the Moluccas re-peopled, with the nutmeg plant, the deſert iſlands of that archipelago, in defiance of all the efforts of the Dutch, who deſtroy thoſe trees in every place where they cannot be ſubſervient to their own commerce.

This

This is not the place for bringing forward the relations which vegetables have to animals. It is ſufficient to obſerve, as we go along, that moſt birds re-ſow the vegetable which feeds them. Nay, we find, without going from home, quadrupeds which convey to a great diſtance the ſeeds of the graſſes. Such, among others, as do not chew the cud, horſes for inſtance, whoſe dung is hurtful to the meadows, for an obvious reaſon, they introduce into them a variety of foreign herbs, as the heath and the ſhort furze, the ſeeds of which they are unable to digeſt. They re-ſow, beſides, a great many others, which adhere to their hair, by the motion of their tail ſimply. There are quadrupeds of ſmall ſize, ſuch as the dormouſe, the hedge-hog, and the marmot, which convey to the moſt elevated regions of the mountains, acorns, beech-maſt, and cheſtnuts.

It is ſingularly worthy of remark, that volatile ſeeds are produced in much greater number than thoſe of other ſpecies; and in this, we are called upon to admire the intelligence of that Providence which foreſaw every thing, and arranged all accordingly. The elevated ſituations for which they are deſtined, were expoſed to be ſpeedily ſtripped of their vegetables, by the declivity of their ſoil, and by the rains, which have a continual tendency to lower them. By means of the volatility of grains, they

they are become, of all the places of the Earth, the moſt prolific in plants. In the mountains is depoſited the Botaniſt's treaſure.

It cannot be too frequently repeated, The remedies provided by Nature always ſurmount the obſtacles which ſhe has oppoſed; and her compenſations ever exceed her gifts. In truth, if you except the inconveniencies of declivity, a mountain preſents to plants the greateſt variety of expoſures. In a plain they have the ſame Sun, the ſame degree of humidity, the ſame ſoil, the ſame wind; but if you aſcend a mountain, ſituated in our Latitude, only twenty-five fathoms of perpendicular height, you change your climate as much as if you had travelled twenty-five leagues northward; ſo that a mountain of twelve hundred fathoms perpendicular height, would preſent us with a ſcale of vegetation as extenſive as that of twelve hundred leagues along the Horizon, which is nearly our diſtance from the Pole: both the one and the other would terminate in a region of perpetual ice. Every ſtep we take upon a mountain, whether aſcending or deſcending, gives us a change of Latitude; and if we encompaſs it round and round, every ſtep changes our Longitude. We ſhall fall in with points where the Sun riſes at eight o'clock in the morning; others, at ten o'clock; others, at noon. We ſhould find an in-

finite

finite variety of expoſures; of cold toward the North; of heat to the South, of rain to the Weſt, of drought to the Eaſt; without taking into the account the different reflections of heat in ſands, rocks, bottoms of vallies, and lakes, which modify them a thouſand various ways.

We muſt proceed farther to obſerve; and who can do it without profound admiration? that the ſeaſon of the maturity of moſt volatile ſeeds takes place toward the commencement of Autumn; and that, from an effect of the univerſal Intelligence, which conſtrains all the parts of Nature to act in concert, then it is that we have the moſt violent gales of wind, about the end of September or beginning of October, called the equinoctial winds. Theſe winds blow in all parts of the Continents, from the boſom of the ſeas to the mountains which are in correſpondence with them. Not only do they convey thither the volatile grains which have then attained to a ſtate of maturity; but likewiſe blend with theſe thick clouds of duſt, which they carry off from lands dried up by the burning heats of Summer, and particularly from the ſhores of the Sea, where the inceſſant motion of the billows, which there break, and continually toſs the pebbly ſtrand backward and forward, reduce the hardeſt bodies to an impalpable powder.

Thoſe

Thoſe emanations of duſt are in many places ſo copious, that I could produce a variety of inſtances of veſſels covered with them, as they were croſſing gulfs, though more than ſix leagues diſtant from land. They are ſo troubleſome in the loftier provinces of Aſia, that all travellers who have viſited Pekin aſſure us, it is impoſſible to walk the ſtreets of that city, for a conſiderable part of the year, without having the face veiled. Thus there are rains of duſt which repair the ſummits of the mountains, as there are rains of water which feed their ſources. Both the one and the other iſſue from the Sea, and return to it by the courſe of the rivers, which are perpetually conveying thither, their conſtant tribute of waters and ſands. The maritime winds unite their efforts toward the autumnal equinox, tranſport from the circumference of the Continents, to mountains the moſt remote from them, the ſeeds and the manure which had flowed from thence, and ſow meadows, groves, and foreſts, on the ſides of precipices, and the moſt inacceſſible peaks. Thus the leaves, the ſtems, the ſeeds, the birds, the ſeaſons, the ſeas, and the winds, concur, in a moſt wonderful manner, to keep up the vegetation of the mountains.

I have been mentioning the relations of plants to mountains; I am mortified that it is not in

my

my power here to insert the relations which mountains themselves have with plants, according to my original intention. All that I can, at present, say on the subject is, that so far are mountains from being the productions of a centrifugal force, or of fire, or of earthquakes, or of water-courses, I know of, at least, ten different species, each of which has a configuration the most perfectly adapted for keeping up, in every particular Latitude, the harmony of the elements relatively to vegetation. Each of them has, moreover, vegetables and quadrupeds peculiar to itself, and which are not elsewhere to be found: this proves to a demonstration, that they are not the work of chance. Finally, among that inconceivable number of mountains which cover the greatest part of the five Zones, and especially the Torrid and the Icy Zones, there is but one single species, the least considerable of all, which presents to the water-courses projecting and retreating angles in correspondence. This, however, is no more their work than the bason of the seas is itself the work of the Ocean. But this interesting subject, of an extent too considerable to admit of it's being here introduced, belongs, besides, to the province of Geography.

Let us now proceed to display the harmonies of aquatic plants.

These

These have dispositions entirely different in their leaves, the bearing of their branches, and, above all, in the configuration of their seeds. Nature, as has already been observed, in order to vary her harmonies, only employs, in very many cases, positive and negative characters. She has bestowed an aqueduct on the pedicle of the leaves of mountain-plants; she withdraws it from those which grow by the side of the waters, and transforms them into aquatic plants. These, instead of having their leaves hollowed out into gutters, are clothed with leaves smooth and sleek, such as the corn-flag, which bears them in form of a poignard's blade, or swelling in the middle like a sword-blade, as those of the species of reed called typha, that common sort, the stem of which the Jews put into the hand of JESUS CHRIST. Those of the nymphæa are plane, and rounded in form of a heart. Some of these species affect other forms, but their long tails are uniformly destitute of a canal. Those of the bulrush are round like a pipe. There is an endless variety of rushes on the brink of morasses, rivulets, and fountains. You will find them of all sizes, from those which have the fineness of a hair, up to the species which grows in the river of Genoa, as large as a cane. Whatever difference there may be in the jointing of their stalks and of their pannicles, they all have, in

in their plan, a round or elliptical form. You will find thoſe ſpecies alone which grow in parched ſituations, to be fluted and hollowed on their ſurface. When Nature intends to render aquatic plants ſuſceptible of vegetation on the mountains, ſhe beſtows aqueducts on their leaves; but when, on the contrary, ſhe means to place mountain-plants by the water's-ſide, ſhe withdraws it. The aloës of the rock has it's leaves hollowed into a ſcoop; the aloës of the water has them full. I am acquainted with a dozen ſpecies of mountain-fern, every one of which has a ſmall fluting along it's branches, and the only ſpecies of the marſhes, which I know, wants it. The bearing of it's branches is likewiſe very different from that of the others. The firſt rears them toward Heaven, the laſt bears them almoſt horizontally.

If the leaves of mountain-plants are conſtructed in the beſt manner poſſible for collecting, at their roots, the waters of Heaven, which they have not always at command; thoſe of aquatic plants are frequently diſpoſed in ſuch a manner, as to remove them, becauſe they are deſtined to grow in the boſom of water, or in it's vicinity. The leaves of trees which love the water's ſide, as the birch, the aſpin, and the poplar, are attached to long and pendent tails. There are others which bear their leaves diſpoſed in form of tiles, as the great cheſt-

nut of India and the walnut. Thoſe of plants which grow in the ſhade, around the trunk of trees, and which derive, by their roots, the humidity collected by the foliage of the tree, as the french-bean and the convolvulus, have a ſimilar bearing. But thoſe which grow entirely under the ſhade of trees, and which have ſcarcely any roots, as muſhrooms, have leaves, that ſo far from pointing toward Heaven, are turned downward to the earth. The greateſt part are formed on the upper ſide into a thick paraſol, to prevent the Sun from drinking up the moiſture of the ſoil in which they grow; and they are divided, on the under ſide, into thin leafy plates, for receiving the vapours which exhale from the ground, nearly as thoſe of the horizontal wheel of a fire-engine receives the ſteam of the boiling water which makes it to turn about. They have, beſides, ſeveral other means of watering themſelves by theſe exhalations. There are many numerous ſpecies, lined with tubes, others are ſtuffed with ſponges. There are ſome whoſe pedicle is hollow inwardly, and which, bearing a chapiter a-top, there collect the emanations of their ſoil, as in an alembic. Thus, there is not a particle of vapour in the Univerſe that goes to waſte.

What has juſt now been ſaid of the inverted forms of muſhrooms, of their leafy plates, of the tubes

tubes and ſponges with which they are lined, for receiving the vapours exhaled from the ground, confirms what was advanced reſpecting the uſe of the leaves of mountain-plants, hollowed into gutters, or conſtructed into the form of a pencil, or of a fan, for receiving the waters of Heaven. But aquatic plants, which had no need of ſuch recipients, becauſe they thrive in water, have, if I may ſo expreſs myſelf, a repulſive foliage. I ſhall here preſent an object of compariſon, calculated to produce conviction of the truth of thoſe principles: for example, the mountain-box-tree, and the caper-plant of the rocks, have their leaves hollowed into a ſpoon form, with the concavity turned toward Heaven; but the vaccinium of the marſhes, (cranberry) or *vaccinia paluſtris*, which is likewiſe furniſhed with concave leaves, bears them inverted, with the cavity turned toward the earth. From this negative character, I was enabled to diſtinguiſh, as a plant of the marſhes, a very rare plant in the Royal Garden, which I ſaw for the firſt time. It is the *lætum paluſtre*, which grows in the marſhes of the Labrador country. It's leaves, formed like little coffee-ſpoons, are all inverted; their convex ſide being turned toward Heaven. The water-lentil of our marſhes, as well as the typha of our rivers, has the middle of it's leaf ſwelled.

 Botaniſts,

Botanifts, on obferving leaves nearly fimilar in plants, on the brink of the water, and on the heights of mountains, never entertained a fufpicion, that they could anfwer purpofes fo different. Many of them, no doubt, are perfons of profound erudition; but their learning is rendered entirely ufelefs to them, becaufe their method conftrains them to proceed in one fingle track, and their fyftem indicates to them only one kind of obfervations. This is the reafon that their moft numerous collections, frequently, prefent nothing but a mere vocabulary. The ftudy of Nature is fpirit and intelligence fimply. Her vegetable order is an immenfe volume of which plants form the thoughts, and the leaves of thofe very plants, the letters. Nay, there is not a very great number of primitive forms in the characters of this alphabet: but by means of their various affemblages, fhe forms, as we do with ours, an infinite number of different thoughts. As it is with language, in order totally to alter the meaning of an expreffion, all that fhe has, in many cafes, to do, is to change an accent. She places rufhes, reeds, arums with a fleek foliage and a full pedicle, on the banks of rivers: fhe traces an aqueduct in the leaf, and transforms them into rufhes, reeds, and arums of the mountains.

We muſt, at the ſame time, be carefully on our guard againſt generalizing theſe means; otherwiſe they will quickly betray us into a miſapprehenſion of her procedure. For example, certain Botaniſts, having ſuſpected that the leaves of ſome plants might very well be adapted for collecting the rain water, believed that they had a perception of this uſe in that of the *dipſacus*, or fullers-thiſtle. It was very eaſy to fall into a miſtake here, for the leaves are oppoſite, and meet at their baſes; ſo that after it has rained, they preſent reſervoirs, which contain, one with another, a good half-glaſs of water, and which are diſpoſed in ſtories along it's ſtem. But they ought to have conſidered, firſt, that the *dipſacus* grows naturally on the brink of waters, and that Nature does not beſtow ciſterns of water on aquatic plants. This would be, according to the proverb, to carry water to the river. Secondly, they might have obſerved, that the tiers formed by the oppoſite leaves of the *dipſacus*, ſo far from being reſervoirs, are, on the contrary, diſchargers, which convey off the rain water from it's roots, to the diſtance of nine or ten inches, on every ſide, by the extremities of it's leaves. They reſemble, in ſome reſpects, the gutters which project from the roofs of our houſes, or thoſe which are formed by the corners of our hats, which ſerve to carry away the rain water from the body, and not to throw it inward. Beſides, the water which

remains in the cavity of the leaves of the *dipsacus* never can get down to the root of the plant, for it is detained there, as at the bottom of a vaſe. It would not even be proper for moiſtening it, for *Pliny* inſiſts that it is brackiſh. The birch-wort, which grows in the trembling and frothy marſhes of Canada, carries, at it's baſe, two leaves, formed like the halves of a trumpet ſawed aſunder lengthwiſe. They are both concave, but have, at the extremity that is fartheſt from the plant, a kind of bill, ſhaped like a ſpout. The water which remains in the receivers of theſe aquatic plants, is, perhaps, deſtined to ſupply drink to the ſmall birds, which ſometimes find themſelves not a little embarraſſed how to come at it, in the time of inundations.

It is neceſſary carefully to make a diſtinction between the elementary, and the relative, characters of plants. Nature obliges the man who ſtudies her, not to hold to external appearances, and, in order to form his underſtanding, ſhe makes him riſe from the means which ſhe employs, to the ends which ſhe propoſes. If certain aquatic plants ſeem to preſent, in their foliage, ſome of the characters of mountaineers, there are upon the mountains, ſome which ſeem to preſent characters ſimilar to thoſe of the waters; ſuch, for example, is the broom. It bears leaves ſo ſmall, and ſo few

in number, that they appear inſufficient for collecting the water neceſſary to it's growth, and ſo much the more, that it thrives in ſoils the moſt parched. Nature has indemnified it in another manner. If it's leaves are ſmall, it's roots are very long. They go in queſt of coolneſs to a great diſtance. I have ſeen ſome of them extracted from the earth, which were more than twenty feet in length, and it was neceſſary, after all, to break them off, it being impoſſible to reach the extremities. This prevents not the ſcanty leaves from exhibiting the mountain-character; for they are concave, they point toward Heaven, and are lengthened out, like the under bill of a bird.

The greateſt part of aquatic vegetables throw the water off from them, ſome by their port; ſuch as the birch, the branches of which, ſo far from rearing themſelves toward Heaven, fall downward, in form of an arch. The ſame thing may be affirmed of the great cheſtnut and of the walnut, unleſs theſe trees ſhould have changed their natural attitude, by growing in thirſty ſituations. Their bark is uſually ſleek, as that of the birch, or ſcaly, like that of the cheſtnut; but not hollowed into canals, as that of the elm, or the mountain pine. Others have in themſelves a repulſive quality: ſuch are the leaves of the nymphæa, and of ſeveral ſpecies of colewort, on which the drops of water col-

lect into globules, like the particles of quick-ſilver. Nay, there are ſome which it is extremely difficult to moiſten, ſuch as the ſtems of many ſpecies of capillary plants. The laurel, we are told, carries it's repulſive quality to ſuch a degree, as to repel the thunder. If this quality, ſo highly extolled by the Ancients, is really poſſeſſed by the laurel, we muſt, undoubtedly, aſcribe this to it's nature as a fluviatic plant. The laurel grows in abundance on the banks of the rivers of Theſſaly. A traveller, whoſe name is the Sieur *de la Guilletière* *, ſays, in a relation written in a very lively and agreeable manner, that he never ſaw any where ſuch fine laurels as along the ſide of the river Peneus. Hence, perhaps, was ſuggeſted the idea of the metamorpoſis of *Daphne*, the daughter of that river-deity, transformed by *Apollo* into a laurel.

This repulſive property of certain trees, and of ſome aquatic plants, induces me to think that they might be employed around our habitations, as a ſecurity againſt thunder-ſtorms, and that in a manner more certain, and much more agreeable, than electrical conductors, which diſſipate, only by attracting them to the neighbourhood. They might farther be very advantageouſly employed for drying

* See the Voyage to Lacedemon, by the *Sieur de la Guilletière*.

marſh

marſhy grounds; as the attractive qualities of many mountain-vegetables, might be uſed in forming fountains upon heights, by collecting there the vapours which float in the air. There is not, perhaps, an infectious moraſs on the Globe, except in places where men have injudiciouſly deſtroyed the plants whoſe roots abſorbed the humidity of the Earth, and whoſe foliage repelled that of the Heavens.

I pretend not to affirm, however, that the foliage of aquatic plants has no farther uſes: for where is the man who has entered into the endleſs views of Nature? "To whom hath the root of "wiſdom been revealed? or who hath known "her wiſe counſels?" *Radix ſapientiæ cui revelata eſt? et aſtutias illius quis agnovit?* * In general, the leaves of aquatic plants appear, from their extreme mobility, very much adapted to the purpoſe of renewing the air of humid places, and of producing, by their movements, that drying of the ground to which I have juſt alluded. Such are thoſe of reeds, of poplars, of aſpins, of birches, and even of willows, which are ſometimes in motion, though there is not the ſlighteſt degree of wind perceptible.

* Eccleſiaſticus, chap. i. ver. 6.

It

It is farther remarkable, that most of these vegetables emit a very pleasing smell; among others, the poplar and the birch, especially in the Spring; and that a great number of aromatic plants thrive by the water's-side, as mint, sweet marjoram, ciperus, the sweet-smelling-rush, the iris, the *calamus aromaticus*: and, in the Indies, the spice-plants, such as the cinnamon-tree, the nutmeg, and the clove. Their perfumes must contribute very powerfully to diminish the mephitic exhalations, which are natural to marshy and humid places. They have, likewise, many uses relatively to animals, such as affording a shade to the fishes which resort thither, in quest of a shelter from the scorching heat of the Sun.

But one conclusion we may certainly deduce, in favour of our improvements in culture, from the observations now made; namely this, that in the cultivation of plants, the pedicle of whose leaves presents no impress of a canal, it is necessary to water them copiously; for, in this case, they are naturally aquatic. The nasturtium, the mint, and the sweet-marjoram, consume a prodigious quantity. But when plants are provided with a canal, they must be watered more sparingly, for this demonstrates them to be originally natives of the mountains. The deeper this canal is, the less

leſs artificial watering do they require. Every gardener knows, that if you frequently water the aloës, or the taper of Peru, you will kill them.

The ſeeds of aquatic plants have forms not leſs adapted, than thoſe of their leaves, to the places where they are deſtined to grow; they are all conſtructed in a manner the moſt proper for ſailing off. Some of them are faſhioned into the figure of ſhells, others into boats, rafts, ſkiffs, ſingle and double canoes, ſimilar to thoſe of the South-Seas. I can have no doubt, that, by an attentive ſtudy of this part alone, a great number of very curious diſcoveries might be made, reſpecting the art of croſſing currents of every ſort; and I am perſuaded that the firſt men, who were much better obſervers than we are, copied their different methods of travelling, by water, after thoſe models of Nature, of which we, with all our pretenſions to diſcovery, are but feeble imitators.

The aquatic, or maritime pine, has it's kernels incloſed in a kind of little bony ſhoes, notched on the under ſide, and covered over, on the upper, with a piece reſembling a ſhip's hatch. The walnut, which delights ſo much in the banks of rivers, has it's fruit contained in two little boats, whoſe apertures are perfectly fitted to each other. The haſel, which becomes ſo buſhy on the brink of

of rivulets; the olive, which is enamoured of the ſea-ſhore to ſuch a degree, that it degenerates in proportion as you remove it thence, carry their ſeed incloſed in a ſpecies of little caſks, capable of holding out the longeſt voyages. The red berry of the yew, whoſe favourite reſidence is the cold and humid mountain, by the ſide of a lake, is hollowed into a little bell. This berry, on dropping from the tree, is, at firſt, carried down, by it's fall, to the bottom of the water: but it returns inſtantly to the ſurface, by means of a hole, which Nature has contrived, in form of a navel, above the ſeed. In this aperture is lodged a bubble of air, which brings it back to the ſurface of the water, by a mechaniſm more ingenious than that of the divers-bell, in this, that the vacuum of the diving-bell is undermoſt, and in the berry of the yew it is uppermoſt.

The forms of the ſeeds of aquatic-plants are ſtill more curious; for, univerſally, Nature redoubles her ſkill and exertions in favour of the little and the weak. That of the bulruſh reſembles a lobſter's eggs; that of fennel is a real canoe in miniature, hollowed in the middle, with both ends raiſed into a prow. There are others grooved into each other, reſembling pieces of wood diſpoſed for a float, and worm-eaten; ſuch are thoſe of the horned poppy. Thoſe which are deſtined

to

to thrive on the brink of waters deſtitute of current, are wafted by ſails; ſuch is the ſeed of a ſcabious plant of our own country, which grows on the border of moraſſes. Beſides, the difference of this from the other ſpecies of ſcabious, whoſe ſeeds are crowned with pronged hairs, in order to faſten themſelves on the hairs of the animals which tranſplant them, the one, laſt-mentioned, is overtopped by a half-bladder open, and reſting on it's ſummit like a gondola. This half-bladder ſerves it, at once, as a ſail by water, and as a vehicle by land. Theſe means of natation, though endleſsly varied, are common, in all climates, to the grains of aquatic plants.

The almond of the river of the Amazons, known by the name of *totoca*, is incloſed in two ſhells, exactly ſimilar to thoſe of an oyſter. Another fruit on the ſtrand of the ſame river, which abounds in almond-trees, has a perfect reſemblance, in colour and form, to an earthen pot, with it's little lid *; it goes by the name of the monkey's porridge-pot. Others are formed into large bottles, as the fruit of the great gourd. There are ſeeds incruſted in a coat of wax, which makes them float, ſuch are the berries of the wax-tree, or royal

* See engravings of moſt of thoſe ſeeds, in *John de Laet*'s Hiſtory of the Weſt-Indies.

pimenta

pimenta of the ſhores of Louiſiana. The formidable apple of the mancenilla, which grows on the ſea-ſhore of the iſlands ſituated between the Tropics, and the fruit of the manglier, which grows there actually in the ſalt-water, are almoſt ligneous. There are others with ſhells ſimilar to the ſea-urchin, without prickles. Many are coupled, and perform their voyage like the double canoe, or balſe, of the South-Sea. Such is the double cocoa of the Sechelles-Iſlands.

If you examine the leaves, the ſtems, the attitudes, and the ſeeds of aquatic plants, you will always remark in them characters relative to the places where they are deſtined to grow, and in harmony with each other; ſo that, if the ſeed has a nautical form, it's leaves are deprived of an aqueduct; juſt as in mountain-plants, if the grain is volatile, the pedicle of the leaf, or the leaf altogether, preſents a channel.

I ſhall aſſume, as an inſtance of the nautical harmonies of plants, the naſturtium, with which every one is acquainted. This plant, which bears flowers ſo agreeable, is one of the creſſes of the rivulets of Peru. It muſt be obſerved, firſt, that the foot-ſtalks of it's leaves have no conduit, like thoſe of all aquatic plants; they are inſerted in the middle of the leaf, which they ſupport like an umbrella,

umbrella, to ward off from them the water which falls from Heaven. It's ſeed, when freſh, has exactly the form of a boat. The upper part is raiſed into a ſlope, like a bridge to let the water run off; and you diſtinguiſh perfectly, in the lower part, a poop and a prow, a keel and a bottom. (*See the annexed Plate.*) The little furrows of the ſeed of the naſturtium are characters common to moſt nautical grains, as well as the triangular forms, and thoſe of the kidney or keel. Thoſe furrows, undoubtedly, prevent them from rolling about in all directions, conſtrain them to float along lengthwiſe, and give them the direction the beſt adapted to the track of the water, and to the paſſage of the narroweſt ſtraits. But they have a character ſtill more general; it is this, that they ſwim in their ſtate of maturity, which is not the caſe with grains deſtined to grow in the plains, ſuch as peaſe and lentils, which ſink to the bottom.

Some ſpecies of theſe, nevertheleſs, ſuch as the french-bean, ſink, at firſt, to the bottom, and riſe to the ſurface when penetrated with the water. Others, on the contrary, float at firſt, and ſink afterward. Such is the Egyptian bean, or the ſeed of the colochaſia, which grows in the waters of the Nile. In order to ſow it, you are under the neceſſity of rolling it up in a ball of earth; and in that ſtate it is thrown into the water. Without this precaution,

precaution, not one would remain on the ſhores where you would wiſh it to grow. The natability of aquatic ſeeds is, undoubtedly, proportioned to the length of the voyages which they have to perform, and to the different gravity of the waters in which they are deſtined to ſwim. There are ſome which float in ſea-water, and ſink in freſh, which is lighter than ſea-water by one thirty-ſecond part: ſuch preciſion is in the balancing of Nature! I believe that the fruit of the great India cheſtnut, which thrives on the ſhores of the ſalt creeks of Virginia are in this ſituation. In a word, I am ſo entirely convinced of all the relations which Nature has eſtabliſhed among her Works, as to conclude, that the time when the ſeeds of aquatic plants drop, is regulated, in moſt caſes, by that of the overflowing of the rivers where they grow.

It is a ſpeculation well worthy of the attention of the philoſophic mind, to trace thoſe vegetable fleets ſailing along, night and day, with the current of the rivulets, and arriving, undirected by any pilot, on unknown regions. There are ſome which, by the overflowing of the waters, now and then loſe themſelves in the plains. I have ſeen them, ſometimes, accumulated upon each other, in the bed of torrents, preſenting around the pebbles where they had germinated, waves of verdure of the moſt beautiful ſea-green. You would have thought

thought that *Flora*, pursued by ſome River-god, had dropped her baſket in the urn of that deity. Others, more fortunate, iſſuing from the ſources of ſome ſtream, are caught by the current of the greater rivers, and conveyed away to embelliſh their diſtant banks with a verdure not their own.

There are ſome which croſs the vaſt Ocean; and, after a long navigation, are driven, by the very tempeſts, on the regions which they adorn and enrich. Such are the double cocoas of the Sechelles, or Mahé Iſlands, which the Sea carries regularly every year a diſtance of four hundred leagues, and lands them on the coaſt of Malabar. The Indians, who inhabit it, were long under the perſuaſion, that thoſe annual preſents of the Ocean muſt have been the produce of a palm-tree that grew under it's billows. They gave them the name of marine cocoa-nuts; and aſcribed wonderful virtues to them. They ſet as high a value upon them as upon ambergris; and to ſuch a pitch was this extravagance carried, that many of thoſe fruits have been ſold as high as a thouſand crowns a-piece. But the French having, ſome years ago, diſcovered the Iſland of Mahé, which produces them, and which is ſituated in the fiftieth degree of South-Latitude, imported them in ſuch quantities to India, that they ſunk at once in value and in reputation; for men, in every coun-

try, prize thoſe things only which are rare and myſterious.

In every iſland where the eye of the traveller has been able to contemplate the primordial diſpoſitions of Nature, he has found their ſhores covered with vegetables, all the fruits of which poſſeſs nautical characters. *James Cartier* and *Champlain* repreſent the ſtrands of the lakes of North-America as ſhaded by ſtately walnut-trees. *Homer*, who has ſo attentively ſtudied Nature, at times, and in places, where ſhe ſtill retained her virgin beauty, has planted the wild-olive along the ſhores of the iſland on which *Ulyſſes*, floating upon a raft, is thrown by the tempeſt. The navigators who have made the firſt diſcoveries in the ſeas of the Eaſt-Indies, frequently found in them ſhallows planted with cocoa trees. The Sea throws ſuch quantities of fennel-ſeed on the ſhores of Madeira, that one of it's bays has obtained the name of Funchal, or Fennel-Bay.

It was by the courſe of thoſe nautical ſeeds, too careleſsly obſerved by modern Seamen, that the Savages formerly diſcovered the iſlands to windward of the countries which they inhabited. They formed conjectures reſpecting a tree at a great diſtance, on ſeeing it's fruit caſt upon their ſhores. By ſimilar indications, *Chriſtopher Columbus* acquired

acquired the aſſurance, that another world exiſted. But the regular winds and currents from the Eaſt, in the South-Sea, had carried them long before to the Nations of Aſia; of which I ſhall ſay ſomething toward the end of this Study.

There are, beſides, vegetables of an amphibious nature. They are diſpoſed in ſuch a manner, that one part of their foliage raiſes itſelf toward Heaven, and the other forms an arcade, and bends downward to the ground. Nature has given to their ſeeds, likewiſe, the power of at once flying and ſwimming. Such is the willow, the ſeed of which is enveloped in a cobweb down, which the winds tranſport to a great diſtance, and which floats along the ſurface of the water, without wetting itſelf, like the downy feathers of the duck. This down is compoſed of ſmall capſules, like the bottom of a lamp, and with two beaks, filled with ſeeds, which are crowned with a plume: ſo that the wind conveys thoſe capſules through the air, and likewiſe tranſports them, by ſailing, along the face of the water. This configuration was admirably adapted, to be the vehicles of the ſeeds of plants which grow by the ſide of ſtagnant waters and lakes. The ſame thing holds as to the ſeeds of the poplar; but thoſe of the alder, which grows on the banks of rivers, have no plumage, becauſe

the current of the ſtream is deſigned to convey them from place to place.

The ſeeds of the fir, and of the birch, have, at once, volatile and nautical characters; for the fir has it's kernel attached to a membranous wing; and the birch has it's grain embraced by two wings, which give it the appearance of a little ſhell. Theſe trees grow, at once, on the wintry mountains, and on the margin of the lakes of the North; their ſeeds had occaſion not only to ſail over ſtagnant waters, but to be tranſported through the air over the ſnows, in the midſt of which they take delight. I have no doubt that there may be ſpecies of theſe trees, the ſeeds of which are altogether nautical. Thoſe of the linden-tree are carried in a ſpherical body, ſimilar to a little bullet. This bullet is affixed to a long tail, from the extremity of which deſcends obliquely a follicle of conſiderable length, whereby the wind carries it away to a great diſtance, ſpinning it round and round. When it drops into the water, it plunges about the length of an inch in it, and ſerves, in ſome ſort, as ballaſt to it's tail, and to the little leaf attached to it, which thus, being brought to a vertical ſituation, perform the functions of a maſt and a ſail. But the examination of ſo many curious varieties would carry me too far.

This

This would be the proper place to ſpeak of the roots of vegetables; but I am little acquainted with what paſſes under ground. Beſides, in all Latitudes, on heights, as well as by the water's-ſide, we find the ſame ſubſtances nearly, muds, ſands, pure mould, rock, which muſt produce a much greater reſemblance in the roots of plants than in the other parts of their vegetation. I have no doubt, however, that Nature has eſtabliſhed, on this ſubject, relations, the knowledge of which would be highly uſeful, and that a cultivator, ſomewhat experienced, might be able, by inſpecting the root of a vegetable, to determine the ſpecies of ſoil beſt adapted to it. Thoſe which are very hairy ſeem moſt proper for ſandy grounds. The cocoa-tree, which grows to a very large ſize on the ſhores of the Torrid Zone, thrives in pure ſand, which it interlaces with ſuch a prodigious quantity of hairy fibres, as to form a ſolid maſs around it. It is on this baſis that it effectually reſiſts the moſt violent tempeſts, in the midſt of a moving ſoil. What is ſingularly remarkable in the caſe of this plant, it never ſucceeds ſo well as in the ſand on the ſea-ſhore, and generally languiſhes in the interior of a country.

The Maldivia Iſlands, which are, for the moſt part, nothing but ſandy ſhallows, are the moſt renowned regions of all Aſia, for the abundance and

the beauty of their cocoa-trees. There are other vegetables of the ſhores, the roots of which are drawn out like cords. This configuration renders them exceedingly proper for binding together the ground, and thereby defending it againſt the inroads of the watery element. Such are, among ourſelves, the alder, the reed, but, above all, a ſpecies of dogs-graſs, which I have ſeen very carefully cultivated in Holland along the dikes.

Bulbous plants appear, in like manner, to take pleaſure in ſoft muds, into which they cannot penetrate very far, from the roundneſs of their bulbs. But the elm extends it's roots at pleaſure on the declivity of the mountain; and the oak inſerts his ſturdy pivots into it, to lay hold of the ſucceſſive ſtrata of which it is compoſed. Other plants preſerve, on the high grounds, by their creeping foliage and their ſuperficial roots, the emanations of duſt which the winds there depoſit. Such is the *anemone nemoroſa*. If you find a ſingle foot of it on a hill, in a wood not greatly frequented, you may reſt aſſured, that it diffuſes itſelf like a network through the whole extent of that wood.

There are trees, the trunks and the roots of which are admirably contraſted with obſtacles which appear to us accidental, but which provident Nature foreſaw. For example, the cypreſs of

of Louisiana grows with it's foot in the water, chiefly on the banks of the Méchassipi, whose vast shores it magnificently shades. It rises there to a height which surpasses that of almost any of the trees of Europe *. Nature has given to the trunk of this stately tree, a circumference of more than thirty feet, in order to enable it to resist the ices from the lakes of the North, which discharge themselves into that river, and the prodigious rafts of timber which float down it's stream, and which have obstructed most of it's mouths to such a degree, as to interrupt the navigation to vessels of any considerable burthen. And, to put it beyond a doubt, that she designed the thickness of it's trunk for withstanding the shock of floating bodies, it is remarkable, that, at the height of six feet, she suddenly diminishes the size of it at least a third, the full magnitude having become superfluous at that degree of elevation : and for the purpose of securing it in another manner, still more advantageous, she raises out of the root of the tree at four or five feet distance all around, several large stumps from one foot to four feet high. These are not shoots ; for their head is smooth, and bears neither leaves nor branches : they are real ice-breakers.

* See Father *Charlevoix*, his History of New France, vol. iv.

The tupelo, another great tree of Carolina, which grows likewiſe by the water's ſide, but in creeks, has nearly the ſame dimenſions at it's baſe, excepting the ice-breakers, or palliſades. The ſeeds of thoſe trees are fluted, as I have already obſerved to be the caſe with aquatic ſeeds in general; and that of the cypreſs of Louiſiana differs conſiderably, by it's nautical form, from that of the cypreſs of the mountains of Europe, which is volatile. Theſe obſervations are ſo much the more worthy of credit, that Father *Charlevoix*, who, in part, relates them, deduces no conſequence whatever from the facts, though he was abundantly capable of interpreting their uſe.

It muſt now be apparent of what importance it is to connect the ſtudy of plants with that of the other Works of Nature. It is poſſible to aſcertain, by their flowers, the expoſure to the Sun which is beſt adapted to them: by their leaves, the quantity of water that is neceſſary to them; by their roots, the ſoil which is moſt ſuitable; and by their fruits, the ſituations in which they ought to be placed, together with new relations to the animals which feed upon them. By fruit I mean, as Botaniſts likewiſe do, ſeed of every ſpecies.

The fruit is the principal character of the plant. Of this we may form a judgment, firſt, from the care

care which Nature has beftowed on it's formation and prefervation. It is the ultimate term of her productions. If you examine, in a vegetable, the different envelopes which inclofe it's leaves, it's flowers, and it's fruits, you will perceive a moft wonderful progreffion of pains and precautions. The fimple leaf-buds are eafily diftinguifhable from the fimplicity of their cafes. Nay, there are plants which have none at all, as the fhoots of the gramineous, which ftart immediately out of the earth, and ftand in no need of any foreign protection. But the buds which contain flowers are provided with fheaths, or lined with down, as thofe of the apple-tree; or cafed over with glue externally, as thofe of the great India cheftnut; or are inclofed in bags, as the flowers of the narciffus; or fecured in fome way or another, fo as to be very diftinguifhable, even before their expanfion.

You afterwards perceive, that the care employed in dreffing out the flower, was entirely deftined to the fecundation of the fruit; and that when this is once formed, Nature redoubles her precautions, both externally and internally, for it's prefervation. She gives it a placenta, fhe envelops it in pellicles, in fhells, in pulps, in pods, in capfules, in hufks, in fkins, and fometimes in a cafe of thorns. A mother cannot pay more attention to the cradle of her infant. In procefs of time, in order

order that her grown child may be enabled to go abroad, and look for a ſettlement in the world, ſhe crowns it with a tuft of plumage, or incloſes it in a ſhell: furniſhes it with wings to fly away through the air, or with a bark to ſail off along the face of the water.

There is ſomething ſtill more marked, to arreſt our obſervation, in favour of the fruit. It is this, that Nature frequently varies the leaves, the flowers, the ſtems, and the roots of a plant; but the fruit remains conſtantly the ſame, if not as to it's form, at leaſt as to it's eſſential ſubſtance. I am perſuaded that, when ſhe was pleaſed to create a fruit, it was her intention that it ſhould have the power of re-producing itſelf on the mountains, in the plains, amidſt rocks, in ſands, on the brink of waters, and under different Latitudes; and, in order to adapt it to it's ſituation, ſhe varied the watering-pot, the mirror, the prop, the attitude, the buttreſs, and the fur of the vegetable, correſpondingly to the Sun, to the rains, to the winds, and to the ſoil. To this intention, I believe, we ought to aſcribe the prodigious variety of ſpecies in every genus, and the degree of beauty which each attains, when in the ſituation that is natural to it. Thus, in forming the cheſtnut to reach perfection on the ſtony mountains of the South of Europe, and to ſupply the want of corn, which ſcarcely

ſcarcely ſucceeds there, ſhe placed it on a tree which in thoſe regions attains magnificence from it's adaptations.

I have eaten of the fruit of the cheſtnut-tree of the Iſland of Corſica. It is as large as ſmall hen's eggs, and makes excellent food. You may read, in a modern traveller, the deſcription of a cheſtnut-tree, which grew in Sicily, on one of the ridges of Mount Ætna. It's foliage is of ſuch extent, that a hundred cavaliers could repoſe with eaſe under it's ſhade. For that reaſon it obtained the name of *centum cavallo*. Father *Kircher* aſſures us, that he had ſeen, on the ſame mountain, in a place called *Trecaſtagne*, three cheſtnut trees of ſuch a prodigious ſize, that when they were felled, you might have lodged a large flock of ſheep under covert of their bark. The ſhepherds employed them for this purpoſe, in the night-time, and in bad weather, inſtead of penning up their charge in the fold. Nature has granted, to this ſtately vegetable, the faculty of collecting, on the ſteep mountains, the waters of the Atmoſphere, by means of leaves formed like ſo many tongues; and of penetrating, by means of it's ſturdy roots, down to the very bed of fountains in deſpite of lavas and rocks.

Nature has been pleafed, elfewhere, to produce the fruit of this tree with a degree of bitternefs, for the ufe of fome animal no doubt, on the brink of the falt-water creeks, and arms of the Sea, in Virginia. She has beftowed on the tree which bears it, leaves difpofed in form of a tile, a fcaly bark, flowers different from thofe of the European cheftnut-tree, but adapted, unqueftionably, to the humid exhalations, and to the afpects of the Sun to which it is expofed. In a word, fhe has transformed it into the great India cheftnut. It arrives at much greater beauty in it's native country, than in Europe. That of America is the maritime cheftnut-tree; and that of Europe is the cheftnut-tree of the mountains. She has placed, perhaps by a different kind of combination, this fruit, on the beech-tree of our hills, the maft of which is evidently a fpecies of cheftnut.

Finally, by means of one of thofe maternal attentions which have induced her to fufpend, even on herbs, the productions of trees, and to ferve up the fame difhes on the fmalleft tables, fhe has placed before us the fame fruit in the grain of the black corn, which, in it's colour, and it's triangular form, refembles the feed of the beech, called in Latin *fagus*, whence this fpecies of corn has obtained the name of *fagopyrum*. One thing, at any

any rate, is certain, namely, that independent of the mealy ſubſtance, we find, in the black-corn, in the beech-maſt, and in the cheſtnut, ſimilar properties, ſuch as that of cooling exceſſive heat of urine *.

It was, in like manner, the intention of Nature to produce the acorn, in a great variety of expoſures. *Pliny* enumerated, in his time, thirteen different ſpecies in Europe, one of them, which makes very excellent food, is that of the green oak. It is of this that the Poets ſpeak, when they celebrate the felicity of the Golden Age, becauſe it's fruit then ſerved as an aliment to Man. It is worthy of being remarked, that there is not a ſingle genus of vegetable, but what gives in ſome one of it's ſpecies, a ſubſtance capable of being converted into nouriſhment for mankind. The acorn of the green oak is, among the fruits of this genus of trees, the portion reſerved for our uſe. Nature has been pleaſed, after making this proviſion for Man, to ſcatter the other ſpecies of the oak over the different ſoils of America, to ſupply the neceſſities of her other creatures. She has preſerved the fruit, and has varied the other parts of the vegetable. She has placed the acorn, but with the leaves of the willow, on the plant which has,

* See *Chomel's* Treatiſe on Common Plants.

for

for that reaſon, got the name of the willow-leafed oak, and which thrives in that country by the water's-ſide *. She has placed it, together with ſmall and pendent leaves affixed to pliant tails, like thoſe of the aſpin, on the water-oak, which grows there in the marſhes. But when ſhe intended to plant them in dry and parched ſoils, ſhe united to them leaves of ten inches in breadth, adapted to the reception of rain-water, ſuch are thoſe of the ſpecies known by the name of the black oak in that country.

It may be neceſſary farther to obſerve, that the place where any ſpecies of plant produces the fineſt fruit, determines it's principal genus. Accordingly, though the oak has it's ſpecies ſcattered about every where, it muſt be conſidered as of the genus of mountain-trees; becauſe that which grows on the mountains of America, and there diſtinguiſhed by the name of the cheſtnut-leafed oak, yields the largeſt acorns, and is one of the greateſt trees in that part of the world; whereas the water-oak, and the willow-leafed oak, riſe to no great height, and produce very ſmall acorns.

The fruit, as we have ſeen, is the invariable character of the plant. To it, accordingly, Na-

* See the figures of it in Father *Charlevoix*, his Hiſtory of New France, vol. iv.

ture

ture has likewiſe attached the principal relations of the animal kingdom to the vegetable kingdom. It was her intention that an animal of the mountains ſhould find the fruit, on which he has been accuſtomed to live, in the plains, on the ſand, among the rocks, when he is under the neceſſity of changing his country, and eſpecially on the brink of rivers, when he deſcends thither to quench his thirſt. I am not acquainted with a ſingle mountain-plant but what has ſome of it's ſpecies, with their correſponding varieties, ſcattered over all ſituations, but principally on the margin of waters.

The mountain-pine has it's kernels mounted on wings, and the aquatic pine has it's ſeed incloſed in a ſkiff. The ſeeds of the thiſtle, which grows on a parched ſoil, are furniſhed with plumes, to convey them from place to place: thoſe of the fullers-thiſtle, which thrives by the water's ſide, have none, becauſe they had no occaſion for any to aſſiſt them in ſwimming. Their flowers vary for ſimilar reaſons; and though Botaniſts have made two different genera of them, the goldfinch fails not to acknowledge this laſt as a real thiſtle. He reſts himſelf upon it, when he finds it convenient to go and cool himſelf on ſome watery bank. He forgets, on beholding his favourite plant, the ſandy downs where he was born,

born, and cheers the banks of the rivulet, with the muſic of his ſong, and the beauty of his plumage.

It appears to me impoſſible to acquire any thing like a knowledge of plants, unleſs by ſtudying their geography, and their ephemeris. Without this double illumination, which mutually reflects, their forms will be for ever ſtrange to us. The greateſt part of Botaniſts, however, pay no manner of regard to this. In making their collections, they remark not the ſeaſon at which plants grow, nor the place where, nor the aſpect to which they are expoſed. They carefully attend to all their intrinſic parts, and eſpecially to their flowers; and after this mechanical examination, depoſit them in their herbary, and imagine they have a thorough knowledge of them, eſpecially if they have had the good fortune to dignify them, by impoſing ſome Greek name. They reſemble a certain huſſar, of whom I have heard, who having happened to find a Latin inſcription in brazen characters, on an antique monument, diſengaged them one after another, and tumbled them together into a baſket, which he diſpatched to an Antiquarian of his friends, with a requeſt that he would inform him what they meant. They no more lead us to an acquaintance with Nature, than a Grammarian would give us a reliſh for the genius

genius of *Sophocles*, by presenting us with a naked catalogue of his tragedies, of the division of their acts and scenes, and of the number of verses which compose them. With equal absurdity are they chargeable who collect plants, without marking their relations to each other, and to the elements; they scrupulously preserve the letter, but suppress the sense of it. Far different was the manner in which a *Tournefort*, a *Vaillant*, a *Linnæus*, prosecuted the study of Botany. If these learned men have not deduced any consequence from those relations, they have, at least, prepared the projecting stones of expectation, which promise the construction of a future fabric of science.

Though the observations which I have just made, respecting the elementary harmonies of plants, are but few in number, I have the confidence to affirm, that they are of very high importance to the progress of agriculture. The point in question is not to determine geometrically the genera of flowers, whose mirrors are the best adapted for reflecting the rays of the Sun in every point of Latitude; the glory of calculating their curves is reserved for future *Newtons*. Nature has outrun our most ardent wishes, in those places where she has been left at liberty to re-establish her own plans. We have it in our power to secure prosperity to ours, in a manner the most beneficial,

neficial, by reducing them into harmony with her's. In order to aſcertain what plants are beſt adapted to ſucceed in ſuch and ſuch a diſtrict, you have only to pay attention to the wild plants which thrive there ſpontaneouſly, and which are diſtinguiſhable for their vigor and for their multitude: then ſubſtitute in their place domeſtic plants, which have the ſame kind of flowers and leaves. Wherever umbelliferous plants grow, you may put in their room ſuch of our culinary vegetables as have moſt analogy with them, from their leaves, their flowers, their roots, and their grains, ſuch as the daucus genus: the arthichoke will there uſefully replace the gaudy thiſtle; the domeſtic plumb-tree ingrafted on a wild ſtock of the ſame plant, in the very place where this laſt ſpontaneouſly ſprung up, will become extremely vigorous. I am perſuaded that by theſe natural approximations, advantage might be derived from the moſt barren ſands and rocks; for there is not a ſingle genus of wild plants but what contains a ſpecies fit for food.

But it was not ſufficient for Nature to have eſtabliſhed ſo many harmonies between plants, and the ſituations in which they were deſtined to vegetate, had ſhe not likewiſe provided means for reſtoring them, when deſtroyed by the intolerant culture of Man. Let a piece of ground be left uncultivated,

uncultivated, for ever ſo ſhort a ſpace of time, and you will preſently ſee it clothed with vegetables. They grow there in ſuch numbers, and ſo vigorouſly, that there is no huſbandman capable of producing an equal quantity, on the ſame ſpot, let him take what pains he will. Theſe ſhoots, however, ſo vigorous and ſo rapid, which frequently take poſſeſſion of our dock-yards of free-ſtone, of our walls of aſhlar, and of our courts paved with granite, are, in many caſes, only a proviſional culture. Nature, who is always advancing from harmony to harmony, till ſhe has attained that point of perfection which ſhe propoſed to herſelf, ſows, at firſt, with graſſes, and herbage of different ſpecies, all abandoned ſoils, waiting for an opportunity of exerting her powers, to raiſe on that very ſpot vegetables of a higher order. On the rude neglected diſtricts, where barren downs alone meet our eyes, poſterity may behold ſtately foreſts ariſe.

We ſhall throw, as our cuſtom is, a ſuperficial glance on the very ingenious methods which Nature employs for preparing and conducting thoſe vegetable progreſſions. We ſhall hence attain a glimpſe, at leaſt, not only of the elementary relations of plants, but of thoſe which exiſt between their different claſſes, and which extend even to the

the animal kingdom. Vegetables which are the moſt contemptible in the eyes of Man, are frequently the moſt neceſſary in the order of Creation.

The principal means employed by Nature for ſecuring the growth of plants of every ſpecies, are the thorny plants. It is very remarkable, that plants of this deſcription are the firſt which appear on lands in fallow, or in foreſts which have been cut down. They are, in truth, wonderfully well adapted to promote foreign vegetations, becauſe their leaves with deep inciſions, like thoſe of the thiſtle and echium, or their ſprigs bent into an arch, as thoſe of the bramble, or their horizontal and interlaced branches, like thoſe of the black-thorn, or their boughs briſtled with briars and unprovided with leaves, as thoſe of the ſea-ruſh, leave underneath and around them many intervals through which other vegetables may ariſe, and find protection from the tooth of moſt quadrupeds. Nurſeries of trees are frequently to be found in their boſom. Nothing is more common in coppice-woods than to ſee a young oak ſtart out of a tuft of brambles, which enamels the earth all around, with it's cluſters of prickly flowers; or a young pine ariſe out of a yellow brake of marine-ruſhes.

When

When theſe trees have once acquired a certain degree of growth and ſize, they ſtifle, by their ſhade, thoſe thorny plants, which ſubſiſt no longer, except along the ſkirts of the woods, where they enjoy air ſufficient for their vegetation. But in this ſituation, ſuch plants are ſtill going on to extend the empire of their ſuperiors, from year to year, over the plains. Thus, the thorny plants are the original cradles of the foreſts; and the ſcourge of the agriculture of Man, is the bulwark of that of Nature.

Man has, however, imitated, in this reſpect, the proceſſes of Nature; for if he wiſhes to protect the newly ſown ſeeds of his garden, he finds it frequently neceſſary to cover them with prickly branches of one ſort or another. It appears to me probable, that there is not a heath but what, in time, might become a foreſt, were their commoners reſtrained from driving their flocks thither to paſture, for the cattle crop the tender ſhoots of the trees as faſt as they ſpring up. This, in my opinion, is the reaſon why the declivities of the lofty mountains of Spain, of Perſia, and of many other parts of the World, are not clothed with trees: it is becauſe of the numerous flocks of ſheep which are driven thither, in Summer, and which roam over their different chains. I am fully convinced that thoſe mountains were covered, in

the earlier ages of the World, with forefts which were laid low by their firft inhabitants; and that they would refume their ancient clothing, though now naked and defert, were the cattle to pafture on them no longer. It is very remarkable, that thofe elevated regions are fowed over with prickly plants, juft as our heaths generally are.

Don *Garcias de Figueroa*, Ambaffador from Spain at the Court of *Cha-Abas*, King of Perfia, relates, in the account which he has given of his journey, that the lofty mountains of Perfia, which he croffed, and where the Turcomans are continually ftraying, as they tend their fleecy charge, were covered with a fpecies of thorny fhrub, which grew luxuriantly in the moft parched fituations. This fame fhrubbery ferved as a retreat to a great number of partridges.

From this circumftance we take occafion to obferve, that Nature employs the birds, particularly, to fow the thorny plants in places the fteepeft and moft inacceffible. They are accuftomed to retire thither in the night, and there depofit, with their dung, the ftony feeds of the bramble-berry, of the berry of the eglantine, of the barberry, and of moft thorny fhrubs, which, from relations no lefs wonderful, are indigeftible in their ftomach.

Birds have, beſides, particular harmonies with thoſe vegetables, as we ſhall make appear in it's proper place. Not only do they find on them a plentiful ſupply of food, and ſhelter under them, but downs for lining their neſts, as on thiſtles, and on the cotton-tree of America; ſo that if many of them reſort for ſafety to the elevation of towering trees, others find it in the thorny brake. There is not a ſingle buſh but what has it's peculiar bird.

Independantly of the plants proper to each ſituation, and which are there domeſticated, there are ſome in a ſtate of inceſſant peregrination, and flit round the earth, without ſettling in any fixed abode. We can eaſily have a conception of the cauſe of this conſtant removal, by ſuppoſing, what is actually the truth, that ſeveral of ſuch plants ſhed their ſeeds only at the ſeaſon when certain regular winds blow, or at certain revolutions of the currents of the Ocean. Whatever may be in this, I am of opinion that we muſt rank, under this deſcription, many plants which were known to the Ancients, but are not now to be found. Such, among others, is the celebrated *lazerpitium* of the Romans, the juice of which, called *lazer*, ſold for it's weight in ſilver. This plant, according to *Pliny*, grew in the vicinity of the city of Corenum, in Africa; but had become ſuch a rarity in his

time as hardly any where to be ſeen. He tells us that a ſingle plant of it had been found, under the reign of *Nero*, and that it was ſent to this Prince as a great curioſity.

Modern Botaniſts pretend, that the lazerpitium is the ſame plant with the *ſilphium* of our gardens. But they are evidently in an error, from the deſcriptions which the Ancients, and, among others, *Pliny* and *Dioſcorides* have left us of it. For my own part, I have no doubt that the lazerpitium is of the number of the vegetables which are deſtined to flit along the Earth, from Eaſt to Weſt, and from Weſt to Eaſt. It is, perhaps, at preſent, on the weſtern ſhores of Africa, whither the eaſterly winds may have conveyed it's ſeeds; perhaps, likewiſe, by the revolutions of the weſterly winds, it may have returned to the place where it was in the days of *Auguſtus*; or it may have been conveyed into the plains of Ethiopia, among Nations totally unacquainted with it's pretended wonderful qualities.

Pliny enumerates a great many other vegetables, which are, at this day, to us equally unknown. It may merit obſervation, that thoſe vegetable apparitions have been contemporary with ſeveral ſpecies of flitting birds, which have likewiſe diſappeared. It is well known that there are ſeveral claſſes of birds,

birds, and of fishes, which do nothing but migrate incessantly over the Earth and through the Seas; some, in a certain revolution of days; others, at the end of a certain period of years. Many plants may be subjected to a similar destiny. This Law extends even to the Heavens, in which some new star is, from time to time, making it's appearance. Nature, as I think, has disposed her Works in such a manner, as to have always some novelty in reserve, in order to keep Man continually in exercise. She has established, in the duration of the existence of the different beings of each kingdom, concerts of a moment, of an hour, of a day, of a moon, of a year, of the life of a man, of the duration of a cedar, and, perhaps, of that of a globe: but this, undoubtedly, is known to the SUPREME BEING alone.

I am persuaded, at the same time, that the greatest part of flitting plants must have a principal centre, such as a steep rock, or an island in the midst of the Sea, from whence they diffuse themselves over all the rest of the world. This leads me to deduce, what I consider as an irrefragable argument in support of the recent Creation of our Globe; it is this, were the Globe of very remote antiquity, all the possible combinations of the propagation of plants by seed, would have been already completed all over the World. Thus, for example,

example, there would not be an uninhabited iſland and ſhore of the Seas of India, which you would not find planted with cocoa-trees, and ſown with cocoa-nuts, which the Ocean wafts thither every year, and which it ſcatters alternately on their ſtrands, by means of the variety of it's monſoons and of it's currents. Now, it is unqueſtionably certain, that the radiations of that tree and it's fruit, the principal focuſes of which are in the Maldivia Iſlands, are not hitherto diffuſed over all the iſlands of the Indian Ocean.

The Philoſopher *Francis Leguat*, and his unfortunate companions, who were, in the year 1690, the firſt inhabitants of the ſmall Iſland of Rodriguez, which lies a hundred leagues to the eaſtward of the Iſle of France, found no cocoa-treees in it. But, preciſely at the period of their ſhort reſidence there, the Sea threw upon the coaſt ſeveral cocoa-nuts in a ſtate of germination; as if it had been the intention of Providence to induce them, by this uſeful and ſeaſonable preſent, to remain on that iſland, and to cultivate it.

Francis Leguat, who was unacquainted with the relations which ſeeds have to the element in which they are deſigned to grow, was very much aſtoniſhed to find that thoſe fruits, which weighed from five to ſix pounds, muſt have performed a voyage

voyage of fixty or fourfcore leagues, without being corrupted. He took it for granted, and he was in the right, that they came from the Ifland of St. Brande, which is fituated to the North-eaft of Rodriguez. Thofe two defert iflands had not, as yet, from the Creation of the World, communicated to each other all their vegetables, though fituated in a current of the Ocean which fets in alternately, in the courfe of one year, for fix months toward the one, and fix months toward the other.

However this may be, they planted thofe cocoa-nuts, which, in the fpace of a year and a half, fent out fhoots of four feet in height. A bleffing from Heaven, fo diftinctly marked, had not the power of detaining them in that happy ifland. An inconfiderate defire of procuring for themfelves women conftrained them to abandon it, notwithftanding the remonftrances of *Leguat*, and plunged them into a long feries of calamities, which few of them were able to furvive. For my own part, I I can entertain no doubt, that had they repofed that confidence in Providence which they had reafon to do, it's care would have conveyed wives for them into that defert Ifland, as it had fent to them the gift of the cocoa-nut.

To

To return to the ſubject of vegetable navigation; all the combinations and the verſatilities of their ſowings, would have been long ago completed in iſlands lying between the ſame parallels, and in the ſame monſoons, if the World had been eternal. The double cocoa-nuts, the nurſeries of which are in the Sechelles Iſlands, would have diffuſed themſelves, and would have had time to germinate on the Malabar coaſt, on which the Sea is from time to time throwing them. The Indians would have planted upon their ſhores thoſe fruits to which they aſcribed virtues ſo miraculous, while the palm-tree, which bears them, was ſo entirely unknown but twelve years ago to the people of this coaſt, that they believed them to be natives of the bottom of the Sea, and thence gave them the appellation of marine cocoa-nuts. There are, in like manner, a multitude of other fruits between the Tropics, of which the primordial ſtocks are in the Moluccas, in the Philippines, in the iſlands of the South-Sea, and which are entirely unknown on the coaſts of both Continents, and even in the adjacent iſlands, which, undoubtedly, would have become there the objects of cultivation to their inhabitants, had the Sea been allowed ſufficient time to multiply the projection of them on their ſhores.

I ſhall

I ſhall purſue this reflection no farther; but it evidently demonſtrates the newneſs of the World. Were it eternal, and exempted from the care of a Providence, it's vegetables would long ſince have undergone all the poſſible combinations of the chance which re-ſows them. We ſhould find their different ſpecies in every ſituation where it was poſſible for them to grow. From this obſervation I deduce another conſequence, namely this, That the AUTHOR of Nature evidently intended to link Mankind together, by a reciprocal communication of benefits, the chain of which is, as yet, very far from being completed. Where is, for example, the benefactor of Humanity, who ſhall tranſport to the Oſtiacs and the Samoïèdes of Waigats Strait, Winter's tree from the Straits of Magellan, the bark of which unites the ſavour of cloves, of pepper, and of cinnamon? And who is the man that ſhall convey to Magellan's Strait the peaſe-tree of Siberia, to feed the ſtarving Patagonian.

What a rich collection might Ruſſia make, not only of the trees which thrive in the northern and the ſouthern regions of America, but of thoſe which, in all parts of the World, crown the lofty, ice-covered mountains, whoſe elevated ridges have a temperature approaching to that of her plains? Wherefore beholds ſhe not her foreſts enriched with the pines of Virginia, and with the cedars of Mount

Mount Lebanon? The desert shores of the Irtis might every year clothe themselves with the same species of oats wherewith so many Nations, inhabiting the banks of the rivers of Canada are principally supported. Not only might she collect in her plains the trees and the plants of cold Latitudes, but a great number of annual vegetables, which grow during the course of a Summer, in warm and temperate Latitudes. I know, by experience, that the Summer's heat is as powerful at Petersburg as under the Line.

There are, besides, parts of the ground, in the North, which have configurations perfectly adapted to afford a shelter against the northerly winds, and to multiply the warmth of the Sun. If the South has it's icy mountains, the North has it's reverbatory vallies. I have seen one of those small vallies, near Petersburg, at the bottom of which flows a brook that never freezes, even in the midst of Winter. The rocks of granite, wherewith Finland is roughened all over, and which, according to the report of Travellers, cover most of the lands of Sweden, of the shores of the Frozen Ocean, and all Spitzbergen, are sufficient for producing the same temperatures, in many places, and for diminishing in them, to a considerable degree, the severity of the cold.

I have

I have seen, in Finland, near Wiburg, beyond the sixty-first degree of Latitude, cherry-trees entirely exposed to the weather, though these trees are natives of the forty-second degree; that is, of the kingdom of Pontus, from whence *Lucullus* transplanted them to Rome, after the defeat of *Mithridates*. The peasantry of that Province cultivate tobacco with success, which is a much more southerly plant, being originally a native of Brasil. It is, I admit, an annual plant, and that it does not acquire, in it's northern situation, a very high degree of perfume; for they are under the necessity of exposing it to the heat of their stoves, in order to bring it to a state of perfect maturity. But the rocks with which Finland is covered over, would undoubtedly present, to attentive eyes, reverberating situations, which might bring it to a sufficient degree of maturity, without the aid of artificial heat.

I myself found, not far from the city of Fredericksham, upon a dunghill, under the shelter of a rock, a very lofty tuft of oats, the produce of a single seed, consisting of thirty-seven stalks, loaded with as many ears completely ripe, without reckoning a multitude of other small sucklers. I gathered it, with an intention of having it presented to her Imperial Majesty, *Catharine* II. by my General M. *Dubosquet*, under whose orders, and in

whose

whofe company I was then vifiting the fortified places of that province: it was likewife his intention; but our Ruffian attendants, carelefs, as all flaves are, fuffered it to be loft. He was exceedingly vexed at this, as well as I: I cannot help thinking, that a fheaf of corn fo rich and beautiful, the produce of a province, confidered, even at Peterfburg, as fmitten with fterility, becaufe of the rocks which cover it's furface, and procured for it, from ancient Geographers, the epithet of *lapidofa*, (ftony) would have been as acceptable to her Majefty, as the huge block of granite which fhe has fince had conveyed from thence, to be formed, at Peterfburg, into the bafis of a ftatue of *Peter* the Great.

I have feen, in Poland, feveral private individuals cultivate the vine and the apricot-tree with very great fuccefs. Mr. *de la Roche*, Conful from the Prince of Moldavia, carried me, when at Warfaw, to a little garden, in the fuburbs of that City, which produced to the occupier an annual revenue of one hundred piftoles, though it did not contain quite thirty of the laft-mentioned tree. It was totally unknown in that country a hundred and fifty years ago. The apricot was firft introduced into it by a Frenchman, valet-de-chambre to a Queen of Poland. This man raifed the fruit fecretly, and made prefents of it to the Grandees of the Country, pretending

pretending that he had received it from France, by the couriers of the Court. The great people did not fail to pay him magnificently for his preſents; and this ſpecies of commerce became to him the foundation of an ample fortune, by means of which his great-grand-children are at this day the moſt opulent Bankers of that Country.

What I have ſaid reſpecting the poſſibility of enriching Ruſſia and Poland with uſeful vegetables, is not only in the view of acknowledging, the beſt way in my power, the gracious reception with which I was honoured by perſons of rank, and by the Government of thoſe Countries, when I was a ſtranger among them; but becauſe theſe indications tend equally to the improvement of France, the Climate of which is more temperate. We have icy mountains, capable of producing all the vegetables of the North; and reverberating vallies equally adapted to the production of moſt of thoſe of the South. It would not be proper, as our cuſtom is, to make an effort to render this ſpecies of culture general through a whole diſtrict, but to ſet it a-going in ſome little ſheltered expoſure, or ſmall winding valley. The influence of theſe poſitions is of no great extent. Thus, the famous Conſtantia vine of the Cape of Good-Hope ſucceeds perfectly only on a ſmall ſpot of ground, ſituated at the bottom of a little hill, whereas the

adjoining and ſurrounding vineyards do not produce the muſcadine grape of any thing like the ſame quality. Of this, too, I have my own perſonal experience.

In France, it would be proper to look for ſheltered aſpects, ſuch as we have been deſcribing, in places where there are white ſtones in abundance, the colour of which is the beſt adapted to reverberate the rays of the Sun. Nay, I believe, that marl is indebted to it's white colour, for part of the heat which it communicates to the lands on which it is ſpread; for it reflects upon them the rays of the Sun with ſo much activity, as to burn up the firſt ſhoots of many herbs. This is the reaſon, if I am not miſtaken, why marl, which has, in other reſpects, the principles of fecundation within itſelf, kills a great many of the ſmaller herbs, which are accuſtomed to grow under the ſhade of the corn, and whoſe firſt leaves are more tender than thoſe of corn, which is, in general, the moſt hardy of gramineous plants.

It would be farther neceſſary to look for thoſe fortunate expoſures in the vicinity of the Sea, and under the influence of it's winds, which are ſo neceſſary to the vegetation of many plants, that ſeveral of them refuſe to grow in the inland parts of a country. Such is, among others, the olive-tree, which

which it has been found impoſſible to propagate in the interior of Aſia and of America, though the Latitude be, in other reſpects, favourable. Nay, I have remarked, that it is not fruitful in iſlands, and on ſhores where it is excluded from the ſea-breezes. To this cauſe I aſcribe the ſterility of thoſe which have been planted in the Iſle of France, on it's weſtern ſhore; for it is ſheltered from the Eaſt-winds by a chain of mountains. As to the cocoa-tree, it will not thrive, between the Tropics, unleſs it has, if I may venture to ſay ſo, it's root in the ſea-water. It is, I firmly believe, for want of thoſe geographical conſiderations, and ſome others of a ſimilar nature, that many plans of improvement in cultivation have failed in France, and in her Colonies.

However that may be, it might be poſſible to find, within the kingdom, an icy mountain, with, perhaps, a reverberating valley below. It would be a moſt agreeable employment to go in ſearch of ſuch a ſituation, and the greateſt benefits might be derived from it. We might convert it into a Royal Garden, which ſhould preſent to our Sovereign a ſpectacle of the vegetation of a multitude of climates, upon one line, of leſs than fifteen hundred fathoms of elevation. There he might bid defiance to the burning heat of the dog-ſtar, under the ſhade of cedars, on the moſſy bank of

a rivulet iſſuing from the ſnow; and, perhaps, eſcape the ſeverity of Winter's cold, at the bottom of a valley with a ſouthern aſpect, under the palm-tree, and amidſt a field of ſugar-canes. We might there naturalize the animals which are the compatriots of thoſe vegetables. He might hear the braying of the rein-deer of Lapland, from the ſame valley in which he would ſee the peacocks of Java building their neſts. This landſcape would collect around him a part of the tributes of the Creation, and exhibit to him an image of the terreſtrial paradiſe, which was ſituated, as I ſuppoſe, in a ſimilar poſition. In ſerious truth, I cannot help expreſſing a wiſh, that our Kings would extend their ſublime enjoyments, as far as the ſtudy of Nature has purſued it's reſearches under their flouriſhing Empire *.

It now remains, that I examine the harmonies which plants form with each other. Theſe har-

* *Neſcia mens hominum fati ſortiſque futuræ!* Ah, blind to futurity! Little did good *Saint-Pierre* think, that the ill-fated Prince, for whom he took ſo much delight to plant and decorate this earthly Paradiſe, was, in the courſe of a few fleeting years, to be dethroned, impriſoned, condemned, and publicly executed, in the Metropolis of his own Kingdom; and the very name of King proſcribed by a Nation once enthuſiaſtically attached to Royalty. How wonderful are the Works of Nature! How myſterious the Ways of Providence! H. H.

monies conſtitute the inexpreſſible charms laviſhed on the ſites which Nature has ſowed and planted with her own hand; and they are to be the ſubject of the enſuing ſection.

VEGETABLE HARMONIES OF PLANTS.

We are going to apply to plants the general principles laid down in the preceding Study, by examining, one after another, the harmonies of their colours, and of their forms.

The verdure of plants, which is ſo grateful to the eye, is a harmony of two colours oppoſite in their elementary generation, of yellow, which is the colour of the Earth, and of blue, which is the colour of the Heavens. Had Nature dyed plants yellow, they would have been confounded with the ground; if blue, they would have been confounded with the Heavens and the Waters. In the firſt caſe, all would have appeared earth; in the ſecond, all would have appeared ſea: but their verdure gives them contraſts the moſt delightful with the grounds of this magnificent picture, and conſonances equally agreeable with the yellow colour of the Earth, and with the azure of the Heavens.

The green colour poſſeſſes this farther advantage, that it accords in a moſt wonderful manner with all the others, which ariſes from it's being the harmony of the two extreme colours. Painters, who are endowed with taſte, hang the walls of their exhibition-rooms with green, in order that the pictures, of whatever colours they may be, may detach themſelves from that ground without harſhneſs, and harmonize upon it without confuſion *.

Nature, not ſatisfied with this firſt general tint, has employed, in extending it over the ground of her ſcene, what Painters call *tranſitions.* She has appropriated a particular ſhade of bluiſh green, which we call ſea-green, to plants which grow in the vicinity of water, and of the Heavens. This is the ſhade which, in general, tinges the plants of the ſhores, as reeds, willows, poplars; and thoſe of high grounds, as the thiſtle, the cypreſs, and the pine; and which makes the azure of the rivers to harmonize with the verdure of the

* Undoubtedly, when they put on a green ground, pictures of plants, or landſcapes, ſuch pictures detach themſelves from it but indifferently. There is, in my opinion, a tint better adapted to be the ground of a picture-gallery; namely, gray. This tint, formed of black and white, which are the extremes of the chain of colours, harmonizes with every other, without exception. Nature frequently employs it in the Heavens, and on the Horizon, by means of vapours and of clouds, which are generally of that colour.

meadows,

meadows, and the azure of the Heavens with the verdure of the heights. Thus, by means of this light and fugitive tint, Nature diffuſes delicious harmonies over the limits of the waters, and along the profiles of landſcapes; and it is productive of a ſtill farther magic to the eye, in that it gives greater apparent depth to the valleys, and more elevation to the mountains.

Something more wonderful ſtill challenges our attention, namely this, that though ſhe employs but one ſingle colour in arraying ſo many plants, ſhe extracts out of it a quantity of tints ſo prodigious, that each of thoſe plants has it's own, peculiar to itſelf, and which detaches it ſufficiently from it's neighbour to be diſtinguiſhable from it; and each of theſe tints is varying, from day to day, from the commencement of Spring, when moſt of them exhibit themſelves in a bloody verdure up to the laſt days of Autumn, when they are transformed into various yellows.

Nature, after having thus harmonized the ground of her picture, by means of a general colour, has detached from it every vegetable in particular, by means of contraſts. Such as are deſigned to grow immediately on the ground, on ſtrands, or on duſky rocks, are entirely green, leaves and ſtems, as the greateſt part of reeds, of graſſes, of moſſes,

of tapers, and of aloès; but thoſe which are deſtined to ariſe out of the midſt of herbage, have ſtems of different tints of brown; ſuch are the trunks of moſt trees, and the ſtalks of ſhrubs. The alder, for example, which thrives amidſt the graſſy turf, has ſtems of an aſh-coloured gray; but the wallwort, which entirely reſembles it in all other reſpects, and which grows immediately on the ground, is green all over. The mugwort, which grows along hedges, has reddiſh ſtems, by which it is eaſily diſtinguiſhable from the neighbouring ſhrubs. Nay, there are, in every genus of plants, certain ſpecies which, by their ſhining colours, ſeem to have been formed for terminating the limits of their claſſes. Such is, in the ſorb genus, a ſpecies called the Canadian ſervice tree, the branches of which are of a coral red. There are, in the willow tribe, oſiers whoſe ſcions are as yellow as gold; but there is not a ſingle plant which does not detach itſelf entirely from the ground which ſurrounds it by it's flowers and by it's fruits.

It is impoſſible to ſuppoſe that ſo many varieties ſhould be mechanical reſults of the colour next to which bodies are placed; for example, that the bluiſh green of moſt mountain-vegetables ſhould be an effect of the azure of the Heavens. It is worthy of being remarked, that the blue colour is not

not to be found, at leaſt as far as I know, in the flowers or in the fruits of lofty trees; for, in this caſe, they would be confounded with the Heavens; but it is very common on the ground, in the flowers of herbs, ſuch as the blue-bottle, the ſcabious, the violet, the liverwort, the iris, and many others. On the contrary, the colour of the earth is very common in the fruits of lofty trees, ſuch as the cheſtnut, the walnut, the cocoa-nut, and the cone of the pine. Hence we have an intimation, that the point of view of this magnificent picture was taken from the eye of Man.

Nature, after having diſtinguiſhed the harmonic colour of each vegetable, by the contraſting colour of it's flowers, and of it's fruits, has followed the ſame laws in the forms which ſhe has given them. The moſt beautiful of forms, as we have ſeen, is the ſpherical form; and the moſt agreeable contraſt which it is capable of forming, is when found in oppoſition to the radiating form. You will frequently find this form and it's contraſt in the aggregation of the flowers that go by the name of radiated, as the daiſy, which has a circle of ſmall white divergent petals, ſurrounding it's yellow diſk: we find it, likewiſe, with other combinations, in the blue-bottle, in the aſters, and a multitude of other ſpecies. When the radiating parts of the flower are outermoſt, the ſpherical parts are inmoſt,

inmoſt, as in the ſpecies which I have juſt named; but when the firſt are inmoſt, the ſpherical parts are outmoſt: this may be remarked in thoſe whoſe ſtamina are drawn out into length, and the petals in ſpherical portions, ſuch as the flowers of the hawthorn and of the apple-tree, and moſt part of the roſaceous and liliaceous plants. Sometimes the contraſt of the flower is with the ſurrounding parts of the plant. The roſe is one of thoſe in which it is moſt ſtrongly marked: it's diſk is formed of beautiful ſpherical portions, it's calix is briſtled with beards, and it's ſtalk with thorns.

When the ſpherical form is found placed, in a flower, between the radiating and the parabolic, then there is a complete elementary generation, the effect of which is always highly agreeable; it is this, too, which is produced by moſt of the flowers that have juſt been named, by the profile of their calices, which terminate their projecting ſtems. The noſegay girls are ſo ſenſible of the value of this combination, that they ſell a ſimple roſe on it's branch at a much higher price than they would aſk for a large poſy of the ſame flowers, eſpecially if there are on it a few buds, which preſent the charming progreſſions of the florification. But Nature is ſo vaſt, and my incapacity ſo great, that I muſt reſtrict myſelf to throwing a ſimple glance on the contraſt, which ariſes from the

ſimple

ſimple oppoſition of forms: it is ſo univerſal, that Nature has given it to plants which had it not in themſelves, by oppoſing them to others which have a configuration entirely different.

The ſpecies oppoſite in forms are almoſt always in company. When you fall in with an old willow, on the bank of a river, which art has not degraded, you may frequently ſee upon it a great convolvulus covering the radiated foliage of the tree with it's own heart-formed leaves, and it's bell-ſhaped white flowers, to make up the defect of apparent flowers, which Nature has denied to this tree. Different ſpecies of ropeweed produce the ſame harmonies on various ſpecies of high gramineous plants.

Theſe plants, called creeping, are ſcattered over the whole vegetable kingdom, and are appropriated, as I ſuppoſe, to each vertical ſpecies. They have a great variety of methods of fixing themſelves on the upright plant, which would alone merit a particular treatiſe. There are ſome which turn themſelves ſpirally around the trunks of foreſt trees, ſuch as the honey-ſuckle; others, as peaſe, have hands with three to five fingers, by which they lay hold of ſhrubbery: it is very remarkable, that thoſe hands do not make their appearance till they have acquired a height at which they begin to have

have occaſion for them as a ſupport; others, as the baſtard-pomegranate, attach themſelves in form of cork-ſcrew; others form a ſimple hook with the tail of their leaf, as the naſturtium: the pink employs a ſimilar method of adheſion. Theſe two beautiful flowers are ſupported in our gardens with rods; but it would be a problem well worthy of the inveſtigation of Floriſts, to aſcertain what are the auxiliary plants, if I may call them ſo, to which theſe were deſigned to unite themſelves, in the places where they are native: delightful groups might be formed by their re-union.

I am perſuaded that there is not a vegetable but what has it's oppoſite in ſome parts of the Earth: their mutual harmony is the cauſe of the ſecret pleaſure which we feel in wild rural ſcenes, where Nature is at liberty to combine them. The fir-tree riſes, in the foreſts of the North, like a lofty pyramid, of a dark green, and with a motionleſs attitude. The birch is almoſt always found in it's vicinity, and grows to nearly the ſame height, is of the form of an inverted pyramid, of a lively verdure, with a moveable foliage, continually playing about with every breath of the wind. The round-leafed trefoil loves to grow in the midſt of the fine graſs, and to adorn it with it's own flowery noſegay. Nay, I believe that Nature has made thoſe deep inciſions in the leaves of a great many vegetables,

vegetables, entirely in the view of facilitating alliances of this ſort, and of opening a paſſage for the graſſes, the verdure and delicacy of whoſe ſtems form with them an infinity of contraſts. Of this inſtances innumerable may be ſeen in uncultivated fields, where tufts of graſs pierce through the broad plants of the thiſtle and the echium. This arrangement has, likewiſe, been made, in order that the graſſes, which are moſt uſeful of all vegetables, might receive a portion of the rain from Heaven, through the interſtices of the broad foliage of thoſe privileged children of Nature, which would ſtifle every thing around them, but for thoſe profound inciſions. Nature does nothing merely for the pleaſure of doing it, but always connects with it ſome reaſon of utility: this appears to me the ſo much more decidedly marked, that the inciſions in leaves are much more common, and deeper in the plants and under-ſhrubbery, which riſe to no great height, than in trees.

The harmonies reſulting from contraſt, are to be found even in the waters. The reed, on the brink of rivers, raiſes into the air it's radiating leaves, and it's embrowned diſtaff, whereas the nymphæa extends at it's feet a broad heart-formed foliage, and roſes of yellow gold: the one preſents, on the waters, a continued palliſade, and the other a platform of verdure.

Similar

Similar oppofitions prefent themfelves in the moft frightful of climates. *Martens*, of Hamburg, who has given us a very good account of Spitzbergen, tells us, that when the feamen belonging to the veffel in which he navigated along it's coafts, heaved up the anchor, they feldom failed to bring up with it a very broad leaf of the *alga marina*, fix feet in length, and attached to a tail as long: this leaf was fmooth, of a brown colour, fpotted with black, ftriped with two white ftripes, and made in form of a tongue: he calls it the plant of the rock. But what is very fingular, it was ufually accompanied by a hairy plant, about fix feet in length, like a horfe's tail, and formed of hairs fo fine, that one might denominate it, fays he, the filk of the rock. He found on thofe difmal fhores, where the empire of *Flora* is in fuch a ftate of defolation, the *cochlearia* (fcurvy grafs) and the forrel, which grew together. The leaf of the firft is rounded in form of a fpoon, that of the other is lengthened into the fhape of the iron head of an arrow. A Phyfician of confiderable ability, of the name of *Bartholin* *, has obferved, that the virtues of their falts are as oppofite as their configurations; thofe of the firft are alkalis, thofe of the other are acids; and from their union refults what medical men call a neutral falt,

* See *Chomel*'s Hiftory of Common Plants.

which

which they ought rather to call a harmonic ſalt, the moſt powerful remedy which can be employed as an antiſcorbutic, and the ſcurvy is a diſeaſe which is readily, and uſually caught in thoſe dreadful climates.

For my own part, I apprehend that the qualities of plants are harmonic as their forms; and that as often as we find them grouped agreeably and conſtantly, there muſt reſult from the union of their qualities, for nouriſhment, for health, or for pleaſure, a harmony as agreeable as that which ariſes from the contraſt of their figures. This is a preſumption that I could ſupport, by referring to the inſtinct of animals, which, in browſing on the herbage, vary the choice of their aliments; but this conſideration would lead me away from my ſubject.

I ſhould never come to a concluſion, were I to go into a detail reſpecting the harmonies of ſo many plants which we undervalue, becauſe they are feeble or common. If we ſuppoſe them, for thought's ſake, of the ſize of our trees, the majeſty of the palm-tree would diſappear before the magnificence of their attitudes and of their proportions. Some of them, ſuch as the echium, riſe like ſuperb candleſticks, forming a vacuum round their centre, and rearing toward Heaven their prickly

prickly arms, loaded, their whole length through, with lamps of violet-coloured flowers. The verbascum, on the contrary, extends around it, it's broad leaves of solemn drapery, and sends up from it's centre a long distaff of yellow flowers, as salutary to the stomach, as grateful to the touch. The violet, of deep blue, contrasts, in the Spring, with the primrose, expanding it's golden cup with a scarlet brim. On the embrowned angles of the rock, under the shade of ancient beech-trees, the mushroom, white and round as an ivory piece for the chess-board, arises out of a bed of moss of the most beautiful green.

Mushrooms alone present a multitude of unknown consonances and contrasts. This class is, first, the most varied of all those of the vegetables of our climates. *Sebastian le Vaillant* enumerates one hundred and four species of them in the vicinity of Paris, without taking into the account the fungoïds, which furnish, at least, a dozen more. Nature has dispersed them over most shady places, where they frequently form contrasts the most extraordinary. There are some which thrive only on the naked rock, where they present a forest of small filaments, each of which supports it's particular chapiter. There are some which grow on substances the most abject, with forms the most solemn; such is that which thrives on what falls from

from the horſe, and which reſembles a Roman hat, whence it has borrowed it's name. Others preſent agreeable conſonances: ſuch is that which grows at the foot of the alder, under the form of a cockle. What nymph has planted a ſhell by the root of a tree of the rivers?

This numerous tribe appears to have it's deſtiny attached to that of the trees, which have each a muſhroom appropriated to itſelf, and rarely to be found elſewhere: ſuch are thoſe which grow only on the roots of plumb-trees and pines. To no purpoſe does Heaven pour down it's copious rains; the muſhroom, under covert of it's umbrella, receives not a ſingle drop. They derive the whole ſupport of life from the Earth, and from the potent vegetable to whoſe fortune they have united their own: like thoſe little Savoyards, who are planted as poſts at the gates of the hotels of the Great, they extract their ſubſiſtence out of the ſuperfluity of another; they grow under the ſhade of the Powers of the foreſt, and live on the ſuperabundance of their ſumptuous banquets.

Other vegetables preſent oppoſitions of ſtrength to weakneſs in a different way, and conſonances of protection ſtill more diſtinguiſhed. Thoſe which we have been mentioning, like lordly Chieftains, leave their humble friends at their feet: the others

carry them in their arms, and place them upon their heads. They frequently receive the recompence of their noble hoſpitality. The liannes which, in the Antilles-Iſlands, attach themſelves to the trees of the foreſt, defend them from the fury of the hurricane. The Gallic Oak has oftener than once ſeen itſelf an object of veneration to the Nations, from having carried the miſtletoe in it's branches. The ivy, a friend to monuments and tombs; the ivy, with which, in ancient times, they crowned the Poets who conferred immortality, ſometimes covers with it's foliage the trunks of the ſtatelieſt trees. It is one, among many, of the irreſiſtible proofs of the vegetable compenſations of Nature; for I do not recollect that I ever ſaw the ivy on the trunks of pines, of firs, or of other trees whoſe foliage laſts all the year round. It inveſts thoſe only which are ſtripped by the hand of Winter. Symbol of a generous friendſhip, it attaches itſelf only to the wretched; and when death itſelf has ſmitten it's protector, it reſtores him again the honours of the foreſt where he lives no longer; it makes him revive, by decorating his ſhade with garlands of flowers, and feſtoons of undecaying verdure.

The greateſt part of plants which grow under the ſhade, are adorned with the moſt vivid colours; thus the moſſes diſplay the brilliancy of their emerald

rald green on the duſky ſides of the rocks. In the foreſts, the muſhroom and the agaricum diſtinguiſh themſelves by their colours from the roots of the trees under which they grow. The ivy detaches itſelf from their gray barks by it's ſhining green; the miſtletoe diſcloſes it's branches of a yellowiſh green, and it's fruits ſimilar to pearls, amidſt the thick foliage of the oak. The aquatic convolvulus dazzles you with it's large white bell-ſhaped flowers on the trunk of the willow. The virgin's-bower clothes with verdure the ancient towers, and, in Autumn, her foliage of gold and purple, ſeems to fix, on their ſober eminences, the rich colours of the ſetting Sun. Other plants, entirely concealed from the eye, diſcover themſelves by their perfumes. It is thus that the obſcure violet invites the hand of lovers to the boſom of the prickly ſhrub. And thus is verified, on every hand, that great Law of contraſts, which governs the World: No aggregation is, in plants, the effect of chance.

Nature has eſtabliſhed, in the numerous tribes of the vegetable kingdom, a multitude of alliances, the end of which is unknown to us. There are plants, for example, the ſexes of which are on different individuals, as in the animal Creation. There are others whom you always find united in ſeveral cluſters, as if they loved to live in ſociety;

others, on the contrary, you almoſt always meet with in a ſtate of ſolitude. I preſume, that many of theſe relations are connected with the character of the birds which live on their fruits, and which re-ſow them. The herbage in the meadows frequently repreſent the bearing of the trees in the foreſts; there are ſome which, in their foliage and proportions, reſemble the pine, the fir, and the oak: nay, I believe that every tree has a conſonance in it's correſponding herb. It is by a magic of this ſort, that ſmall ſpots of ground preſent to us the extent of a large diſtrict. If you are under a grove of oaks, and perceive, on an adjoining hillock, tufts of germander, the foliage of which reſembles them in miniature, and you will feel all the effect of a perſpective. Theſe diminutions of proportion extend from trees even down to moſſes, and are the cauſes, in part, of the pleaſure which we enjoy in wild rural ſcenes, where Nature has had leiſure to diſpoſe and accompliſh her plans. The effect of thoſe vegetable illuſions is ſo undoubtedly certain, that if you have the ground cleared, the extent of any particular ſpot, when ſtripped of it's natural vegetables, appears much ſmaller than before.

Nature farther employs diminiſhing ſhades of verdure, which, being lighter on the ſummit of trees than at their baſe, gives them the appearance of

of being more lofty than they really are. She appropriates, besides, the pyramidical form to many mountain-trees, in order to increase the apparent elevation of their site; this is observable in the larch, the fir, the cypress, and in many other plants, which grow on heights. She sometimes unites, in the same place, the effects of seasons and of climates the most opposite. She clothes, in hot climates, the whole sides of mountains with the vegetable called the ice-plant, because it seems entirely covered over with flakes of ice; you would believe that, in the midst of Summer, *Boreas* had breathed upon it all the chilling blasts of the North.

On the other hand, we find, in Russia, mosses in the midst of Winter; which, from the red and smoky colour of their flowers, have the appearance of being set on fire. In our rainy climates, she crowns the summits of hillocks with broom and rosemary; and the tops of ancient towers with the yellow gilly-flower: in the midst of the gloomiest day, you would imagine you saw the rays of the Sun shining upon them.

In another place, she produces the effect of the wind in the midst of perfect stillness. In many parts of America, a bird has only to alight on a

tuft of the ſenſitive plant, in order to put in motion the whole ſtripe, which ſometimes extends to three furlongs. The European traveller ſtands ſtill, and obſerves, with aſtoniſhment, the air tranquil, but the herbage in motion. I myſelf have ſometimes miſtaken, in our own woods, the murmur of poplars and of aſpins, for the bubbling of brooks. Oftener than once, ſeated under their ſhade, on the ſkirt of a meadow, whoſe herbage the winds put into an undulatory motion, this multiplied tremulouſneſs has transfuſed into my blood the imaginary coolneſs of the ſtream.

Nature frequently employs the aërial vapours, in order to give a greater extent to our landſcapes. She diffuſes them over the cavities of vallies, and ſtops them at the windings of rivers, giving you a glimpſe, at intervals, of their long canals, illuminated by the Sun. She thus multiplies their plans, and prolongs their extent. She ſometimes withdraws this magic veil from the bottom of the vallies; and rolling it over the adjacent mountains, on which ſhe tinges it with vermilion and azure, ſhe confounds the circumference of the Earth with the vault of Heaven. It is thus, that ſhe employs clouds as evaneſcent as the illuſions of human life, to raiſe us to Heaven; it is thus that ſhe expands over her moſt profound myſteries, the ineffable

ſenſations

ſenſations of infinity, and that ſhe withdraws from our ſenſes the perception of her Works, in order to convey to our minds a more impreſſive feeling of them.

ANIMAL HARMONIES OF PLANTS.

Nature, after having eſtabliſhed on a ſoil formed of fragments, inſenſible and lifeleſs, vegetables endowed with principles of life, of growth, and generation, accommodated to theſe beings which had, together with theſe ſame faculties, the power of ſelf-motion, diſpoſitions to inhabit them, paſſions to derive their nouriſhment from them, and an inſtinct which impels them to make a proper choice: theſe are animals. I ſhall here ſpeak only of the moſt common relations which they have with plants; but were I to attempt a detail of thoſe which their innumerable tribes have with the elements, with each other, and with Man, whatever might be my ignorance, I ſhould diſcloſe a multitude of ſcenes ſtill more worthy of admiration.

In an order entirely new, Nature has not changed her Laws: ſhe has eſtabliſhed the ſame harmonies and the ſame contraſts, of animals to plants, as of plants to the elements. It would appear natural

to our feeble reaſon, and conſonant to the great principles of our Sciences, which aſcribe ſo much power to analogies, and to phyſical cauſes, that ſo many ſenſible beings which are produced in the midſt of verdure, ſhould be, in proceſs of time, affected by it. The impreſſions of their parents, added to thoſe of their own infancy, which ſerve to explain ſo many appearances in the human ſpecies, acquiring, in them, increaſing ſtrength, from generation to generation, by new tints, ought at length, to exhibit oxen and ſheep as green as the graſs on which they paſture. We have obſerved, in the preceding Study, that as vegetables were detached from the ground by means of their green colour, the animals which live on verdure diſtinguiſh themſelves from it, in their turn, by means of their duſky colours; and thoſe which live on the duſky barks of trees, or of other dark grounds, are inveſted with colours brilliant, and ſometimes green.

On this ſubject, I have to remark, that many ſpecies of the birds of India, which live amidſt the foliage of trees, as the greateſt part of paroquets, many of the colibri, and even of turtles, are of the fineſt green; but independantly of the white, blue, and red marbled ſpots, which diſtinguiſh their different tribes, and render them perceptible at a diſtance upon the trees, the brilliant verdure of

their

their plumage detaches them, to great advantage, from the ſolemn and imbrowned verdure of thoſe ſouthern foreſts. We have ſeen that Nature employs this as the general means of diminiſhing the reflexes of the heat; but, that ſhe might not confound the objects of her picture, if ſhe has darkened the ground of her ſcene, ſhe has beſtowed greater brilliancy on the dreſſes of the actors.

It would appear that Nature has appropriated the ſpecies of animals coloured, in the moſt agreeable manner, to the ſpecies of vegetables, whoſe flowers are the leaſt vivid, as a compenſation. There are much fewer brilliant flowers between the Tropics, than in the temperate Zones; and, as a compenſation, the inſects, the birds, and even the quadrupeds, ſuch as ſeveral ſpecies of monkeys and lizards, are there arrayed in the moſt lively colours. When they reſt on their proper vegetable, they form with them the moſt beautiful contraſts, and the moſt lovely harmonies. I have often ſtood ſtill, in the Weſt-Indies, to contemplate the little lizards, which live on the branches of trees, employ themſelves in catching flies. They are of a beautiful apple-green, and have on their back a ſort of characters of the moſt vivid red, reſembling the letters of the Arabian alphabet. When a cocoa-tree had ſeveral of them diſperſed along it's ſtem, never was there Egyptian Pyramid

of

of porphyry, with it's hieroglyphics, ſo myſterious, and ſo magnificent, in my eyes *.

I have, likewiſe, ſeen flocks of ſmall birds, denominated *cardinals*, becauſe they are red all over, ſettle on ſhrubbery, the verdure of which was blackened by the Sun, and preſent the appearance of girandoles ſtudded with little burning lamps. Father *du Tertre* ſays, that there is not, in the Antilles, a ſpectacle more brilliant, than the alighting of coveys of the parrot ſpecies, called *arras*, on the ſummit of a palm-tree. The blue, the red, and the yellow of their plumage, covers the boughs of the flowerleſs tree, with the moſt ſuperb enamel. Harmonies ſomewhat ſimilar may be ſeen in our own climates. The goldfinch, with his red head, and wings tipped with yellow, appears, at a diſtance, on a buſh, like the flower of the thiſtle in which he was hatched. You would ſometimes take the ſlate-coloured wagtail, when perched on the extremity of the leaves of a reed, for the flower of the iris.

* They have ſometimes ſerved me to explain the moral ſenſe of hieroglyphics, engraven on the obeliſks of Egypt, in honour of her conquering heroes. On beholding the characters traced upon them from right to left, with heads, beaks and paws, they brought to my recollection the little fly-catchers of my palm-trees.

It

It would be a very great curioſity to collect a great number of theſe oppoſitions, and of thoſe analogies. They would lead us to a diſcovery of the plant, which is peculiarly adapted to each animal. Naturaliſts have paid to thoſe adaptations no great degree of attention; ſuch of them as have written the Hiſtory of Birds, have claſſed them according to the feet, the bill, the noſtrils. They ſometimes ſpeak of the ſeaſons of their appearance, but ſcarcely ever of the trees which they frequent. Thoſe only who, employed in making collections of butterflies, are frequently under the neceſſity of looking for them in their ſtate of nymph, or caterpillar, have ſometimes diſtinguiſhed thoſe inſects by the names of the vegetables on which they found them. Such are the caterpillars of the tithymale, of the pine, of the elm, and ſo on, which they diſcovered to be peculiarly appropriated to theſe vegetables. But there is not an animal exiſting but what may be referred to it's own particular correſponding plant.

We have divided plants into aërial, aquatic, and terreſtrial, as animals themſelves are diviſible, and we have found, in the two extreme claſſes, unvarying harmonies with their elements. They may be farther divided into two claſſes, into trees and herbs, as animals likewiſe are into volatile and quadrupeds. Nature does not aſſociate the two kingdoms

kingdoms in consonances, but in contrasts; that is, she does not attach the great animals to the great vegetables; but unites them contrariwise, by associating the class of trees with that of the small animals, and that of herbs with the great quadrupeds: and by means of these oppositions, she bestows adaptations of protection to the feeble, and of accommodation to the powerful.

This Law is so general, that I have remarked, in every country, where there is no great variety in the species of grasses, those of the quadrupeds which live upon them are but few in number; and that wherever the species of trees are multiplied, those of volatiles are likewise so. The truth of this may be ascertained by consulting the herbals of many parts of America, and, among others, those of Guyana and of Brasil, which present but few varieties in the grasses, but a great number in the trees. It is well-known that those countries have, in fact, few quadrupeds natural to them, and that they are peopled, on the contrary, with an infinite variety of birds and insects.

If we cast a glance on the relations of grasses to quadrupeds, we shall find that, notwithstanding their apparent contrasts, there is actually between them a multitude of real correspondencies. The small elevation of the gramineous plants places them within

within the reach of the jaws of quadrupeds; whose head is in a horizontal position, and frequently inclined toward the ground. Their delicate shoots seem formed to be laid hold of by broad and fleshy lips; their tender stems, easily snapped by the incisive teeth; their mealy seeds easily bruised by the grinders. Besides, their bushy tufts, and elastic without being ligneous, present soft litter to ponderous bodies.

If, on the contrary, we examine the correspondencies which exist between trees and birds, we shall find that the branches of trees may be easily clasped by the four-toed feet of most birds, which Nature has disposed in such a manner, that by means of three before and one behind, they may be able to grasp the bough as with a hand. Again, the birds find, in the different tiers of the foliage, a shelter against the rain, the Sun, and the cold, toward which the thickness of the trunks farther contribute. The apertures formed in these, and the mosses which grow upon them, furnish situations for building their nests, and materials for lining them. The round or oblong seeds of trees are accommodated to the form of their bills. Such as bear fleshy fruits are resorted to by birds, which have beaks pointed, or crooked, like a pick-axe.

In

In the islands of the regions situated between the Tropics, and along the banks of the great rivers of America, the greatest part of maritime and fluviatic trees, among others, many species of the palm-tree, bear fruits enclosed in very hard shells, whereby they are enabled to float on the face of the waters, which re-sow them at a great distance; but their covering does not secure them from the attack of the birds. The different tribes of paroquets which have made them their habitation, and of which I have reason to believe that there is a species appropriated to each species of palm-tree, easily find means to open their hard cases with hooked bills, which pierce like an awl, and hold fast like pincers.

Nature has, farther, accommodated animals of a third order, which find in the bark, or in the flower of a plant, as many conveniencies as the quadruped has in a meadow, or the bird in the whole tree: I mean the insects. Certain Naturalists have divided them into six great tribes, which they have characterized, according to custom, but to very little purpose, by Greek names. They class them into *coléopterous*, or cased, insects; as the scarab tribe, such are our may-bugs, or chafers: into *hémipterous*, or half-cased, as the gallinsects, such is the kermés: into *tétrapterous farinaceous*, or four-mealy-winged, as butterflies; into *tétrapterous*, without

without any addition, or four-naked-winged, as bees; into *dipterous*, or two-winged, as the common fly; and into *apterous*, or winglefs, as the ant. But thefe fix claffes admit of a multitude of divifions and of fubdivifions, which unite fpecies of infects, of forms and inftincts the moft diffimilar; and feparate a great many others of them which have otherwife a very ftriking analogy among themfelves.

Whatever may be in this, the order of animals in queftion appears to be particularly attributed to trees. *Pliny* obferves that ants are fingularly fond of the grains of the cyprefs. He tells us, that they attack the cones which contain them, on their half-opening as they arrive at maturity, and plunder them to their very laft feed; and he confiders it as a miracle of Nature, that an infect fo diminutive fhould deftroy the feed of one of the largeft trees in the World. I believe we never fhall be able to eftablifh, in the different tribes of infects, a real order, and in the ftudy of them, that pleafure and utility of which it is fufceptible, but by referring them to the different parts of vegetables. Thus we might refer to the nectars of the flowers, the butterflies and flies which are furnifhed with a probofcis for fipping up their juices; to their ftamina, thofe flies which, like the bee, have fpoon-mouths fcooped out in their thighs, lined with hair,

hair, for collecting their powder, and four wings to affift them in carrying off their booty; to the leaves of plants, the common flies and the gallinfects, which have pointed and hollow prongs for making incifions in them, and for drinking up their fluids; to the grains, the fcarab race, as the weevil, which is defigned to force it's way into the heart of the feed to feed upon it's meal, and which is provided with wings, inclofed in cafes, to prevent their being injured, and with a file to open for itfelf a paffage; to the ftem, thofe worms which are quite naked, becaufe they have no need of being clothed in a fubftance of wood, which fhelters them on every fide, but they are furnifhed with augers, by the help of which they fometimes go nigh to deftroy whole forefts; finally, to the wreck of every fort, the ants which come armed with pincers, and with an inftinct of advancing in bands to cut to pieces, and to carry off every thing that fuits their purpofe.

The defert of this vaft vegetable banquet is hurled down by the rainy torrents to the rivers, and thence to the Sea, where it prefents a new order of relation with the fifhes. It is worthy of remark, that the moft attractive baits which can be prefented to them, are deduced from the vegetable kingdom, and particularly from the grains, or from the fubftances of the plants, which have the

the aquatic characters which we have indicated, ſuch as the hard ſhell of the Levant, the ruſh of Smyrna, the juice of the tithymal, the Celtic ſpikenard, the cummin, the aniſe, the nettle, the ſweet-marjoram, the root of the birthwort, and the ſeed of the hemp. Thus, the relations of theſe plants with fiſhes confirm what has been ſaid of thoſe of their grains with the waters.

By referring the different tribes of inſects to the different parts of plants, and in that way only, can we diſcern the reaſons for which Nature has been determined to beſtow on thoſe diminutive animals figures ſo extraordinary. We ſhould then know the uſes of their utenſils, of which the greater part is hitherto unknown; and we ſhould have continually new occaſion to admire the Divine Intelligence, and to perfect our own. On the other hand, ſuch progreſs in knowledge would diffuſe the cleareſt light over many parts of plants, the utility of which is a world unknown to Botaniſts, becauſe they have conſonances only with animals.

I am perſuaded, that there is not a ſingle vegetable but what has connected with it, at leaſt, one individual of each of the ſix general claſſes of inſects, acknowledged by Naturaliſts. As Nature has divided each genus of plants into different ſpecies, in order to render them capable of growing

in different ſituations; ſhe has, in like manner, divided each genus of inſects into different ſpecies, in order to adapt them to inhabit different ſpecies of plants. For this reaſon ſhe has painted, and numbered, in a thouſand different but invariable ways, the almoſt infinite diviſions of the ſame branch. For example, we conſtantly find on the elm the beautiful butterfly, called the gold-brocade, on account of it's rich colouring. That which goes by the name of the four omicrons, and which lives I know not where, always produces deſcendants impreſſed with that Greek character, four times, on their wings. There is a ſpecies of bee with five claws, which lives on radiated flowers only; without thoſe claws, ſhe could not cling faſt to the plane mirrors of thoſe flowers, and load herſelf from their ſtamina, ſo eaſily as the common bee, which uſually labours at the bottom of thoſe which have a deep corolla.

Not that I imagine any one plant nouriſhes, in it's different varieties, all the collateral branches of one family of inſects. I believe that each genus of theſe extends much farther than the genus of plants which ſerves as it's principal baſis. In this, Nature manifeſts another of her Laws, by virtue of which ſhe has rendered that the beſt which is the moſt common. As the animal is of a nature ſuperior to the vegetable, the ſpecies of the firſt

are

are more multiplied, and more generally diffused than those of the second. For example, there are not so many as sixteen hundred species of plants in the vicinity of Paris; but within the same compass, there are enumerated near six thousand species of flies. This leads me to presume, therefore, that the different tribes of plants cross with those of animals, which renders their species susceptible of different harmonies. Of this a udgment may be formed from the variety of tastes, in birds of the same family. The black-headed yellow-hammer nestles in the ivy; the red-headed in walls, in the neighbourhood of hemp-fields; the brown yellow-hammer builds on trees by the highway's-side, where she finishes off her nest with horse-hair. A dozen species of that bird are enumerated in our climates, each of which has it's particular department. Our different sorts of larks are likewise apportioned to different situations; to the woods, to the meadows, to the heaths, to arable lands, and to the shores of the Sea.

Very interesting observations may be made respecting the duration of vegetables, which are unequal, though subjugated to the influences of the same elements. The oak serves as a monument to the nations; and the *nostocium*, which grows at his foot, lives only a single day. All I shall say upon this head, in general, is, that the period of their

their decay is by no means regulated in conformity to that of their growth; neither is that of their fecundity proportioned to their weakneſs, to climates, or to ſeaſons, as ſome have pretended. *Pliny* * quotes inſtances of holmes, of plane-trees, and of cypreſſes, which exiſted in his time, and which were more ancient than Rome, that is, more than ſeven hundred years old. He farther tells us, that there were ſtill to be ſeen near Troy, around the tomb of Ilus, oaks which had been there from the time that Troy took the name of Ilium, which carries us back to an antiquity much more remote.

I have ſeen, in Lower Normandy, in a village church-yard, an aged yew, planted in the time of *William* the Conqueror; it is ſtill crowned with verdure, though it's trunk cavernous, and through and through pervious to the day, reſembles the ſtaves of an old caſk. Nay, there are buſhes which ſeem to have immortality conferred upon them. We find, in many parts of the kingdom, hawthorns, which the devotion of the Commenalty has conſecrated by images of the Virgin, and which have laſted for ſeveral ages, as may be aſcertained by the inſcriptions upon the chapels which have been reared in the vicinity.

* Natural Hiſtory, book xvi. chap. 44.

But,

But, in general, Nature has proportioned the duration and the fecundity of plants to the demands of animal life. A great many plants expire as ſoon as they have yielded their ſeed, which they commit to the winds. There are ſome, ſuch as muſhrooms, whoſe exiſtence is limited to a few days, as the ſpecies of flies which feed upon them. Others retain their ſeeds all the Winter through, for the uſe of the birds; ſuch are the fruits of moſt ſhrubs.

The fecundity of plants is by no means regulated according to their ſize; but proportionally to the fecundity of the animal ſpecies which is to feed upon them. The pannic, and the ſmall millet, and ſome other gramineous plants, ſo uſeful to man and beaſt, produce incomparably more grains than many plants, both greater and ſmaller than themſelves. There are many herbs which perpetuate themſelves, by their ſeeds, only once a year; but the chickweed renovates itſelf by it's ſeeds, up to ſeven or eight times, without being interrupted in the proceſs even by Winter. It produces ripe ſeeds within ſix weeks from the time of it's being ſown. The capſule, which contains them, then inverts itſelf, turning toward the earth, and half opens, to leave them at liberty to be carried away by the winds, and the rains, which

ſow them again every where. This plant enſures, the whole year through, the ſubſiſtence of the ſmall birds of our climates. Thus, Providence is ſo much the more powerful, as the creature is more feeble.

Other plants have relations to animals the more tenderly affecting, in proportion as climates and ſeaſons ſeem to exerciſe over the animal the greater degree of ſeverity. Were we enabled to inveſtigate theſe adaptations to the bottom, they would explain all the varieties of vegetation, in every latitude, and in every ſeaſon. Wherefore, for example, do moſt of the trees of the North ſhed their leaves in Winter; and wherefore do thoſe of the South retain theirs all the year round? Wherefore, in defiance of the Winter's cold in the North, do the firs there continue always clothed with verdure? It is a matter of no ſmall difficulty to diſcover the cauſe of this; but the end is obviouſly diſcernible. If the birch and the larch of the North drop their foliage, on the approach of Winter, it is to furniſh litter to the beaſts of the foreſt; and if the pyramidical fir there retains it's leaves, it is to afford them ſhelter amidſt the ſnows. This tree then preſents to the birds the moſſes which are ſuſpended on it's branches, and it's cones repleniſhed with ripe kernels. In their vicinity

vicinity, oftimes, thickets of the ſervice-tree diſplay for their uſe the ſhining cluſters of their ſcarlet berries.

In the Winters of our climates, many evergreen ſhrubs, as the ivy, the privet, and others, which remain loaded with black or red fruit, contraſting ſtrikingly with the ſnow, as the primeprint, the thorn, and the eglantine, preſent to the winged creation both a habitation and food. In the countries of the Torrid Zone, the earth is clothed with freſh liannes, and ſhaded with trees of a broad foliage, under which animals find a cool retreat. The trees themſelves, of thoſe climates, ſeem afraid of expoſing their fruits to the burning heat of the Sun: inſtead of rearing them as a cone, or exhibiting them on the circumference of their heads, they frequently conceal them under a thick foliage, and bear them attached to their trunks, or at the ſprouting of their branches: ſuch are the *jacquier*, the banana, the palm-tree of every ſpecies, the *papayer*, and a multitude of others: If their fruits invite not the animals externally, by vivid colours, they call them by the noiſe which they excite. The lumpiſh cocoa-nut, as it falls from the height of the tree which bears it, makes the earth reſound to a conſiderable diſtance. The black pods of the *canneficier*, when ripe, and agitated by the wind, produce, as they

clash against each other, a sound resembling the tic-tac of a mill. When the grayish fruit of the genipa of the Antilles comes to maturity, and falls from the tree, it bounces on the ground with a noise like the report of a pistol *. Upon this signal, more than one guest, no doubt, resorts thither in quest of a repast. This fruit seems particularly destined to the use of the land-crabs, which are eagerly fond of it, and very soon grow fat on this kind of food. It would have answered no purpose to them to see it on the tree, which they are incapable of climbing; but they are informed of the moment when it is proper for food, by the noise of it's fall.

Other fruits, as the jaque and mango, affect the sense of smelling in animals so powerfully, as to be perceptible more than the quarter of a league distant, when the fruit is to windward. I believe that this property, of emitting a powerful perfume, is likewise common to such of our fruits as lie concealed under the foliage, apricots, for instance. There are other vegetables which manifest themselves to animals, if I may use that expression, only in the night-time. The jalap of Peru, or the belle of the night, opens not her strongly-scented flowers except in the dark. The

* Father *du Tertre*'s History of the Antilles.

flower

flower of the nasturtium, or nun, which is a native of the same country, emits, in the dark, a phosphoric light, observed, for the first time, in Europe, by a daughter of the celebrated *Linnæus*.

The properties of these plants convey a happy idea of those delightful climates, in which the nights are sufficiently calm, and sufficiently luminous to disclose a new order of society among animals. Nay, there are insects which stand in no need of any pharos to assist them in steering their nocturnal courses. They carry their lanterns about them; such are the species of luminous flies. They scatter themselves, sometimes, in the groves of orange-trees, of papayas, and other fruit-trees, in the midst of the darkest night. They dart, at once, by several reiterated beatings of their wings, a dozen of fiery streams, which illuminate the foliage and fruits of the trees whereon they settle, with a golden and bluish light *; then, all at once repressing their motion, they plunge again into obscurity. They alternately resume and intermit this sport during the whole night. Sometimes there are detached from them swarms of brilliant sparks of light, which rise into the air, like the emanations of a firework.

* Consult the same Work of *du Tertre*.

Were

Were we to ſtudy the relations which plants have to animals, we ſhould perceive in them the uſe of many of the parts, which are frequently conſidered as productions of the caprice, and of the confuſion, of Nature. So widely extended are thoſe relations, that it may be confidently affirmed, that there is not a down upon a plant, not an intertexture of a ſhrub, not a cavity, not a colour of leaf, not a prickle, but what has it's utility. Thoſe wonderful harmonies are eſpecially to be remarked, with relation to the lodgings and the neſts of animals. If, in hot countries, there are plants loaded with down, it is becauſe there are moths, entirely naked, which clip off their fleece, and weave it into clothing. There is found, on the banks of the Amazon, a ſpecies of reed, from twenty-five to thirty feet high, the ſummit of which is terminated by a large ball of earth. This ball is the workmanſhip of the ants, which retire thither at the time of the rains, and of the periodical inundations of that river: they go up, and deſcend along the cavity of this reed, and live on the refuſe which is then ſwimming around them on the ſurface of the water.

It is, I preſume, for the purpoſe of furniſhing ſimilar retreats to many ſmall inſects, that Nature has hollowed the ſtems of moſt of our plants of the ſhore,

ſhore. The valiſneria *, which grows in the ſtream of the Rhone, and carries it's flower on a ſpiral ſtem, capable of being drawn out in proportion to the rapidity of the ſudden ſwellings of that river, has holes pierced through at the baſis of it's leaves, the uſe of which is much more extraordinary. If you take up this plant by the root, and put it into a large veſſel full of water, you perceive, at the baſis of it's leaves, maſſes of a bluiſh jelly, which inſenſibly lengthen into pyramids of a beautiful red. Theſe pyramids preſently furrow themſelves into flutings, which diſengage from the ſummit, invert themſelves all around, and preſent, by their expanſion, very beautiful flowers formed of rays purple, yellow, and blue. By little and little, each of theſe flowers advances out of the cavity in which it is partly contained, and withdraws to ſome diſtance from the plant, remaining, however, attached to it, by a ſmall filament. You then perceive each of the rays of which thoſe flowers are com-

* Conſult, with regard to the Valiſneria, the Voyage of an anonymous Engliſh traveller, performed in the year 1750, to France, Italy, and the Iſlands of the Archipelago, in four ſmall volumes, vol. i. It is ſtored with judicious obſervations of every kind. Conſult likewiſe, reſpecting the genipa, and the different fruits, plants, and animals of ſouthern countries, the ſprightly Father *du Tertre*, the patriotic Father *Charlevoix*, *John de Laet*, the Hiſtorian, and all travellers who have written on the ſubject of Nature, without the ſpirit of ſyſtem, aſſiſted by the light of reaſon alone.

poſed, aſſume a motion peculiar itſelf, which communicates a circular movement to the water, and precipitates to the centre of each of them all the ſmall bodies which are floating around. If thoſe wonderful expanſions are diſturbed by any ſudden ſhock, immediately every filament contracts, all the rays cloſe, and all the pyramids retire into their cavities; for thoſe pretended flowers are polypuſes.

There are, in certain plants, parts which may be conſidered as characters of uncultivated Nature, but which are, like all the reſt of her Works, evident proofs of the wiſdom and providence of her AUTHOR; ſuch are the prickles. Their forms are varied without end, eſpecially in hot countries. Some are ſhaped like ſaws, like hooks, like needles, like the head of a halberd, and like caltrops. Some of them are round like awls, ſome triangular, like the ſhoemaker's piercer, and ſome flattened like a lancet. There is no leſs variety in their aggregations. Some are arranged on the leaves in balls, like thoſe of the opuntia; others in ſtripes, like thoſe of the Peruvian taper. Some are inviſible, as thoſe of the ſhrub of the Antilles, known by the name of captain's-wood. The leaves of this formidable plant, appear, on the upper ſide, ſmooth and ſhining; but they are covered, on the under ſide, with very delicate prickles, which

which are inserted in ſuch a manner, that, apply your hand to them ever ſo cautiouſly, it is impoſſible to avoid pricking your fingers.

There are other thorns planted only on the ſtems of plants, others are on their branches. In our climates, they are ſcarcely ever to be found, except on ſhrubbery, and on a few trees; but in both Indies, they are ſcattered over a great many ſpecies of trees. Their very various forms and diſpoſitions have relations, of which the greateſt part are to us unknown, to the ſecurity and defence of the birds which live upon them. It was neceſſary that many of the trees of thoſe countries ſhould be armed with thorns, becauſe many quadrupeds are there to be found, capable of climbing them, to eat the eggs and the young of birds, ſuch as the monkey, the civet-cat, the tyger, the wild-cat, the muſk-rat, the opoſſum, the wild rat, and even the common rat.

The Aſiatic acacia * preſents to it's winged inhabitants a retreat abſolutely inacceſſible to their enemies.

* There is a plant of the Aſiatic acacia to be ſeen in that beautiful garden adjacent to the iron gate of Chaillot, which formerly belonged to the virtuous Chevalier de *Genſin*. As to the name of *falſe-acacia*, given to the acacia of America, I muſt obſerve, that Nature produces nothing falſe. She has given varieties

enemies, It bears no prickles on it's trunk, and in it's branches; but at the height of ten or twelve feet, precifely at the place where the tree begins to branch off, there is a belt of feveral rows of large thorns, from ten to twelve inches in length, prefenting an impenetrable rampart of fpikes, nearly refembling the iron head of a halberd. The collar of the tree is encircled by it in fuch a manner, that it is impoffible for any quadruped to get up. The acacia of America, improperly called the falfe-acacia, has it's prickles formed into hooks, and fcattered over it's branches, undoubtedly from fome unknown relation of oppofition to the fpecies of quadruped which makes war on the bird that inhabits it.

There are, in the Antilles Iflands, trees which have no thorny prickles, but which are much more ingenioufly protected than if they had. A plant known in thofe countries by the name of the prickly thiftle, which is a fpecies of creeping taper, attaches it's roots, fimilar to filaments, to the trunk of one of thofe trees, and runs to the ground all around it, to a confiderable diftance, croffing

rieties of all her productions, in all Countries, in order to beftow upon them relations adapted to the elements and to animals; and when we do not find in thefe the characters which we have affigned to them, the charge of falfhood is not, in juftice, to be fixed on her Works, but on our fyftems.

it's

it's branches one over another, and forming an inclosure of them, which no quadruped dares to approach. It likewise produces a fruit very grateful to the palate. On beholding a tree, the foliage of which is harmless, filled with birds that have there fixed their habitation, surrounded about the roots by one of those prickly thistles, and you are presented with the idea of one of those commercial defenceless cities, apparently accessible on every side, but protected all around by a citadel, encompassing it with extended intrenchments. Thus the tree is on one side, and it's thorn on the other.

Quadrupeds which live on the eggs of birds, would be reduced to great distress, did not Nature sometimes produce, on the summits of those very trees, a vegetable of very extraordinary form, which opens a passage to them. It is, in every respect, the opposite of the prickly thistle. It is a root of two feet in length, as thick as a man's leg, pricked, as if pierced with a bodkin, and adhering to a branch of the tree, by a multitude of filaments, somewhat in the same way that the prickly thistle is affixed to the under part of it's trunk. Like the other, it derives it's nourishment from the tree, and emits from ten to twelve great leaves, in form of a heart, of about three feet in length, and two feet in breadth, resembling the leaves of the nymphæa. Father *du Tertre* calls it the false-root of China.

What

What is ſtill more extraordinary, it lets fall, from the top of the tree on which it is placed, in a perpendicular direction, very ſtrong cordage, of the ſize of a quill, the whole length through, which takes root on reaching the ground. The plant itſelf emits no ſmell, but this cordage ſmells ſtrongly of garlic. Undoubtedly, when a monkey, or ſome ſuch clambering animal, perceives this broad ſtandard of verdure, to no purpoſe does the tree oppoſe, around it's root, a fortification of thorns, this ſignal announces that he has a friend within the fortreſs: the ſmell of the cordage, which deſcends down to the ground, directs him to the ſcaling ladder, even during the night; and while the birds are ſleeping in ſecurity on their neſts, confident in the ſtrength of their bulwarks, the enemy gets poſſeſſion of the town through the ſuburbs.

In thoſe countries, the thorns upon the trees afford protection even to the inſects. Bees there carry on their honey making proceſſes in the aged trunks of prickly trees, hollowed by the hand of Time. It is very remarkable that Nature, who has provided this reſource for the bees of America, has with-held from them a ſting, as if thoſe on the trees were ſufficient for their defence. I believe that to this reaſon it may be aſcribed, though no attention has been paid to it, that we have

have never hitherto been able to rear in the Antilles Iſlands, the honey-bees of the country. They refuſed, no doubt, to take up their abode in domeſtic hives, becauſe they did not conſider themſelves as there in a ſtate of ſecurity; but might, perhaps, have been induced to make that choice, had the hives to which they were invited been decorated and defended by thorns.

If Nature employs prickly vegetables for the defence even of flies againſt the attacks of quadrupeds, ſhe ſometimes makes uſe of the ſame means for delivering quadrupeds from the perſecution of common flies. She has, in truth, beſtowed on thoſe which are the moſt expoſed to it, manes and tails, armed with long hair, to drive them away; but the multiplication of thoſe inſects is ſo rapid in warm and humid ſeaſons and countries, as to threaten deſtruction to the whole race of animals. One of the vegetable barriers, oppoſed to them by Nature, is the *dionæa muſcipula*. This plant bears on one and the ſame branch, oppoſite little leaves, beſmeared with a ſugary liquor, reſembling manna, and ſtudded with very ſharp prickles. When a fly perches on one of thoſe little leaves, they inſtantly cloſe with a ſpring, like the jaws of a wolf-trap, and the fly is ſpitted through and through.

There is another ſpecies of the dionœa which catches thoſe inſects with it's flower. When a fly attempts to extract it's nectareous juices, the corolla, which is tubulous, ſhuts at the collar, ſeizes the inſect by the proboſcis, and thus puts it to death. This plant is cultivated in the Royal Garden. It is obſervable, that it's cup-formed flower is white, radiated with red, and that theſe two colours univerſally attract flies, from their natural avidity of milk and of blood.

There are aquatic plants, armed with thorns, proper for catching fiſhes. You may ſee in the Royal Garden, an American plant, called *martinia*, the flower of which has a very agreeable odour, and which, from the form of it's rounded leaves, the ſleekneſs of their tails and of their ſtems, has all the aquatic characters which have been indicated. It has this farther character peculiar to itſelf, that it tranſpires ſo copiouſly as to appear to the touch in a ſtate of continual humidity. I can have no doubt, therefore, that this plant grows in America on the brink of the water. But the ſhell which envelops it's ſeeds poſſeſſes a very extraordinary nautical character. It reſembles a fiſh half dried, white and black, with a long fin upon the back. The tail of this fiſh is drawn out into great length, and terminates in a very ſharp point, bent into the form of a fiſh-hook. This tail uſually

ſeparates

ſeparates into two, and thus preſents a double hook. The configuration of this vegetable fiſh is completely ſimilar in ſize, and in form, to the hook which is employed at ſea for catching goldneys, and at the head of which is figured, in linen, a flying-fiſh, with this exception, that the goldney-hook has but one curve and barb, whereas the ſhell of the martinia has two, which muſt render it's effect more infallible. This ſhell contains ſeveral black ſeeds, ſhrivelled, and ſimilar to the globules of the ſheep's dung flattened.

As I poſſeſs but few books on Botany, I did not know of what country the martinia was a native; but having lately conſulted the Work of *Linnæus*, I find that we got it from Vera-Cruz. The celebrated Naturaliſt, whom I have juſt mentioned, diſcovers, in this ſhell, no reſemblance but that of a woodcock's head; but had he ever ſeen the hook for goldneys, he could not poſſibly have heſitated about preferring this ſimilitude, in the appearance, in as much as the extremity of this pretended beak bends back into two hooks, which prick like needles, and are, as well as the whole ſhell, and the tail, by which it is united to the ſtem, of a ligneous and horny ſubſtance, not eaſily broken aſunder. *John de Laet* * tells us, that the land of

* Hiſtory of the Weſt-Indies, book v. chap. 18.

Vera-Cruz is on a level with the Sea, and that it's port, called *St. John de Hulloa*, is formed by a small island, no higher than the water; so that, says he, when the tide rises very high, the land wholly disappears.

Such inundations are very common at the bottom of the Gulf of Mexico, as we learn from the relation which *Dampier* has given us of the Bay of Campechy, which is in that vicinity. Hence I presume, that the martinia, which grows on the inundated shores of Vera-Cruz, has certain relations, which we know nothing of, to the fishes of the Sea; in as much as the seeds of several trees and plants of those countries, described by *John de Laet*, possess very curious nautical forms. A drawing of the martinia, taken from Nature, is presented fronting page 191 of this Volume.

But there is no occasion to resort to foreign plants, for ascertaining the existence of vegetable relations to animal. The bramble, which affords, in every field through which we pass, a shelter to so many birds, has it's prickles formed into hooks; so that it not only prevents the cattle from disturbing the bird's retirement, but frequently lays them under contribution for a flake of wool or hair, proper for finishing off their nests, as a reprisal for hostility committed, and an indemnification for damages

damages ſuſtained. *Pliny* alleges, that this gave riſe to the pretended animoſity between the linnet and the aſs. This quadruped, whoſe palate is proof againſt thorns, frequently browſes on the ſhrub in which the linnet builds her neſt. She is ſo terrified at his voice, that on hearing it, ſays, he, ſhe kicks down her eggs; and her callow brood die with terror of it. But ſhe makes war upon him, in her turn, by fixing her attack on the ſcratches made in his hide by the prickles, and picking the fleſh, in thoſe tender parts, to the very bone. It muſt be a very amuſing ſpectacle to view the combat between the little and melodious ſongſter, and the dull, braying, but otherwiſe inoffenſive, animal.

Did we know the animal relations of plants, we ſhould poſſeſs ſources of intelligence reſpecting the inſtincts of the brute creation, with which we are totally unacquainted. We ſhould know the origin of their friendſhips, and of their animoſities, at leaſt as to thoſe which are formed in ſociety; for with regard to ſuch as are innate, I do not believe that the cauſe of them was ever revealed to any man. Theſe are of a different order, and belong to another world. How ſhould ſo many animals have entered into life, under the dominion of hatred, without having been offended; furniſhed with ſkill and induſtry, without having ſerved an

apprenticeſhip; and directed by an inſtinct more infallible than experience? How came the electrical power to be conferred on the torpedo, inviſibility on the cameleon, and the light of the ſtars themſelves on a fly? Who taught the aquatic-bug to ſlide along the waters, and another ſpecies of the ſame denomination to ſwim upon the back; both the one and the other for catching their prey, which hovers along the ſurface? The water-ſpider is ſtill more ingenious. She incloſes a bubble of air in a contexture of filaments, takes her ſtation in the middle, and plunges to the bottom of the brook, where the air-bubble appears like a globule of quick-ſilver. There, ſhe expatiates under the ſhade of the nymphæa, exempted from the dread of every foe. If, in this ſpecies, two individuals, different in ſex, happen to meet, and to ſuit each other, the two globules, being in a ſtate of approximation, become united into one, and the two inſects are in the ſame atmoſphere. The Romans, who conſtructed on the ſhores of Baiæ, ſaloons underneath the waves of the Sea, in order to enjoy the coolneſs, and the murmuring noiſe of the waters, during the heats of Summer, were leſs dexterous, and leſs voluptuous. If a man united in himſelf thoſe marvellous faculties which are the portion of inſects, he would paſs for a god with his fellow-creatures.

It

It is of importance for us to be acquainted with, at leaſt, ſuch inſects as deſtroy thoſe which are offenſive to Man. We might turn their mutual hoſtility to good account, by converting it into the means of our own repoſe. The ſpider catches the flies in nets; the formicaléo ſurprizes the ants in a tunnel of ſand; the four-winged ichneumon ſeizes the butterflies on the wing. There is another ichneumon, ſo ſmall and ſo cunning, that it lays an egg in the anus of the vine-fretter. Man has it in his power to multiply at pleaſure the families of inſects which are uſeful to him; and may find means of diminiſhing ſuch as make depredations on his agricultural poſſeſſions. The ſmall birds of our groves tender him, to the ſame effect, ſervices of ſtill greater extent, and accompanied with other circumſtances inexpreſſibly agreeable. They are all directed by inſtinct to live in his vicinity, and about the paſtures and habitations of his flocks and herds. A ſingle ſpecies of them might frequently be ſufficient to protect the cattle from the inſects which infeſt them through the Summer.

There is in the North a gadfly, called *Kourbma* by the Laplanders, and by the Learned, *œſtrus rangiferinus*, which torments the domeſtic reindeer to ſuch a degree as to force them in agony to the mountains, and ſometimes actually plague them to death, by depoſiting their eggs in the ſkin

 of

of the animal. Many differtations have, as the cuftom is, been compofed on this fubject, but no remedy for the evil has been propofed. I am convinced there muft be birds in Lapland, which would deliver the rein-deer from this formidable infect, did not the Laplanders terrify them away by the noife of their fowling-pieces. Thefe arms of civilized Nations have overfpread with barbarifm all our plains. The birds, deftined to embellifh the habitation of Man, withdraw from it, or approach with timidity and miftruft. The found of mufquetry ought to be prohibited, at leaft, around the haunts of the harmlefs cattle. When the birds are not fcared away by the fowler, they follow their inftincts.

I have frequently feen in the Ifle of France, a fpecies of ftarling, called martin, imported thither from India, perch familiarly on the back and horns of the oxen, to pick them clean. To this bird that ifland ftands indebted, at the prefent day, for the deftruction of the locufts, which, in former times, committed fuch ravages upon it. In thofe of our European rural fcenes which ftill exhibit, on the part of Man, fome degree of hofpitality toward the innocent warblers, he has the pleafure of feeing the ftork build her neft on the ridge of his houfe; the fwallow flutter about in his apartments: and the wagtail, along the bank of the river,

river, frisk around his sheep, to protect them from the gnats.

The foundation of all this variety of pleasant and useful knowledge is laid in the study of plants. Each of them is the focus of the life of animals, the species of which there collect in a point, as the rays of a circle at their centre.

As soon as the Sun, arrived in his annual progression, at the sign of the Ram, has given the signal of Spring to our Hemisphere, the rainy and warm wind of the South takes it's departure from Africa, swells the Seas, elevates the rivers above their banks, so that they inundate the adjacent plains, and fatten them with their fertilizing slime; and levels, in the forests, the aged trees, the decayed trunks, and every thing that presents an obstacle to future vegetation. It melts the snows which cover our fields, and forcing it's way to the very Pole, it breaks to pieces, and dissolves the enormous masses of ice which Winter had there accumulated. When this revolution, known all over the Globe by the name of the equinoctial gale, has taken place, in the month of March, the Sun revolves night and day around our Pole, so that there is not a single point, in the whole northern Hemisphere, that can escape his heat.

Every

Every ſtep he advances in his courſe through the Heavens, a new plant makes it's appearance on the Earth. Each of them ariſes in ſucceſſion, and occupies it's proper ſtation at the hour aſſigned to it; at one and the ſame inſtant it receives the light in it's flowers, and the dew of Heaven on it's foliage. In proportion to it's progreſs in growth, the different inſect-tribes which thence derive their nouriſhment, likewiſe diſplay their exiſtence, and unfold their characters. At this epocha, too, each ſpecies of bird reſorts to the ſpecies of plant with which ſhe is acquainted, there to build her neſt, and to feed her young with the animal prey which it preſents to her, to ſupply the want of the ſeeds which it has not as yet produced. We preſently behold the tribes of birds of paſſage flock thither, in queſt of the portion which Nature has provided for them likewiſe. Firſt comes the ſwallow, to preſerve our habitations from the vermin, by planting her neſt around us. The quail forſakes Africa, and grazing the billows of the Mediterranean, and in troops innumerable, is ſcattered over the boundleſs meadows of the Ukraine. The heathcock purſues his courſe northward as far as Lapland. The wild ducks and geeſe, the ſilvery ſwans, forming long triangular ſquadrons in the air, advance to the very iſlands adjacent to the Pole. The ſtork, in former times adored in Egypt, which ſhe abandons,

dons, croffes over Europe, halting here and there to take repofe, even in great cities, on the roofs of the houfes of hofpitable Germany. All thefe birds feed their young on the infects and reptiles which the newly expanded plants have foftered into life.

Then, too, it is that the fifhes iffue in legions, from the northern abyffes of the Ocean, allured to the mouths of rivers by clouds of infects, which are confined entirely to their waters, or expand into life along their banks. They ftem the watery current in fhoals, and advance, fkipping and fpringing, up to the very fources of the ftream; others, as the north-capers, fuffer themfelves to be fwept into the general current of the Atlantic Ocean, and appear, in form of a fhip's bottom, on the coafts of Brafil, and on thofe of Guinea.

Quadrupeds themfelves, likewife, then undertake long peregrinations. Some proceed from the South to the North, with the Sun; others from Eaft to Weft. There are fome which coaft along the rugged chains of mountains; others, follow the courfes of rivers which have never been navigated. Lengthened columns of black cattle pafture, in America, along the banks of the Méchaffipi, which they caufe to refound with their bellowing. Numerous fquadrons of horfes traverfe the rivers and the deferts of Tartary; and wild

fheep

sheep stray bleating amidst it's vast solitudes. These flocks have neither overseer nor shepherd to guide them through the desert, to the music of the pipe; but the expansion of herbage which they know, determines the moment of their departure, and the limits of their progress. It is then that each animal inhabits his natural situation, and reposes under the shade of the vegetable of his fathers. It is then that the chains of harmony exert all their force, and that all, being animated by consonances, or by contrasts, the air, the waters, the forests, and the rocks, seem to be vocal, to be impassioned, to be transported with delight.

But this vast concert can be comprehended by celestial Intelligences only. To Man it is sufficient, in order to study Nature with advantage, that he limit his researches to the study of one single vegetable. It would be necessary, for this purpose, to make choice of an aged tree, in some solitary situation. From the characters which have been indicated, a judgment might easily be formed, whether it be in it's natural position; but still better from it's beauty, and from the accessories which Nature uniformly places in connection with it, where the hand of Man has not interposed to derange the operations. The student would first observe it's elementary relations, and the striking characters which distinguish the diffe-

rent

rent ſpecies of the ſame genus, ſome of which grow at the ſources of rivers, and others at the place of their diſcharge into the Ocean. He would afterwards examine its convolvuluſes, it's moſſes, it's miſtletoes, it's ſcolopendræ, the muſhrooms of it's roots, nay, the very graſſes which grow under it's ſhade. He would perceive, in each of it's vegetables, new elementary relations, adapted to the places which they occupy, and to the tree which ſuſtains, or ſhelters them.

His attention might next be directed to the various ſpecies of animals which reſort to it as a habitation, and he would preſently be convinced, that, from the ſnail up to the ſquirrel, there is not a ſingle one, but what has determinate and characteriſtic relations to the dependancies of it's vegetation.

If the tree in queſtion were growing in a foreſt, itſelf too of conſiderable antiquity, it would, moſt probably, have, in it's vicinity, the tree which Nature deſigned ſhould contraſt with it in the ſame ſite, as, for example, the birch with the fir. It is farther probable, that the acceſſory vegetables and animals of this laſt, would, in like manner, form a contraſt with thoſe of the firſt. Theſe two ſpheres of obſervation would mutually illuminate each other, and would diffuſe the cleareſt light

over

over the manners of the animals which frequent them. We ſhould then have a complete chapter of that immenſe and ſublime Hiſtory of Nature, the alphabet of which is hitherto unknown to us.

I am fully convinced, that without fatigue, and almoſt without any trouble, diſcoveries the moſt curious might be made; were we to reſtrict our enquiries but to one ſingle compartiment, we ſhould diſcover a multitude of the moſt enchanting harmonies. In order to enjoy ſome imperfect ſketches of this kind, we muſt have recourſe to travellers. Our Ornithologiſts, fettered by methods and ſyſtem, only think of ſwelling their catalogue, and diſtinguiſh nothing in birds ſave the feet and the bill. It is not in the neſts that they obſerve them, but in hunting, and in their pouch. They even conſider the colours of their plumage as accidents. It was not by chance, however, that Nature, on the ſhores of Braſil, beſtowed a beautiful carnation colour, with a border of black, on the extremity of the wings of the *Ouara*, a ſpecies of curlew, which inhabits the ſea-green foliage of the *paletuvier*, which grows in the boſom of the waves, and bears no apparent flowers. The *Javia*, another bird of the ſame climate, is yellow over the belly, with the reſt of the plumage gray. It is about the ſize of a ſparrow, and perches on the pepper-plant, the flowers of which have no luſtre,

luſtre, but whoſe grains are eaten by this bird, and re-ſown wherever ſhe takes her flight.

To thoſe correſpondences muſt be joined ſuch as pertain to ſite, which itſelf derives ſo much beauty from the overſhadowing vegetable. Theſe harmonies are detailed by Father *Francis d'Abbeville*. If credit is to be given to the Hiſtory of Voyages by the Abbé *Prevoſt*, there is, on the banks of the Senegal, a fluviatic tree, the leaves of which are thorny, and the branches pendant, in form of an arch. It ſerves as a habitation to birds called kurbalos, or fiſhers, of the ſize of a ſparrow, variouſly coloured. Their bill is very long, and armed with little teeth, reſembling a ſaw. They build a neſt of the bulk of a pear, compoſed of earth, feathers, ſtraw, moſs, and attach it to a long thread, ſuſpended from the extremity of the branches which project over the river, in order to ſecure it from the ſerpents and monkeys, which ſometimes contrive to clamber up after them. You would take thoſe neſts, at a little diſtance, for the fruit of the tree: and ſome of thoſe trees contain to the number of a thouſand. You perceive the kurbalos fluttering inceſſantly along the water, and entering into their neſts with a motion that dazzles the eyes.

According

According to Father *Charlevoix*, there grows in Virginia, on the brink of the lakes, a laurel-leafed yew-tree, which puſhes ſeveral ſtems from it's root, the branches of which embrace all the ſurrounding trees, and climb to the height of more than ſixteen feet. They form, in Summer, an impenetrable ſhade, and in Winter a temperate retreat for the birds. It's flowers have no very ſtriking appearance, and it's fruit grows in round cluſters, loaded with black grains. This yew has for it's principal inhabitant, a very beautiful kind of jay. The head of that bird is adorned with a long black creſt, which it can erect at pleaſure. It's back is of a deep purple. The wings are black on the inſide, blue externally, and white at the extremities, with white ſtripes acroſs every feather. It's tail is blue, and marked with the ſame ſtripes as the wings; and it's cry is far from being diſagreeable.

There are birds which lodge not upon their favourite plant, but oppoſite to it. Such is the colibri, which frequently neſtles, in the Antilles Iſlands, on the ſtraw which thatches a cottage, in order to live under the protection of Man. In our climates, the nightingale conſtructs his neſt under covert of a buſh, chooſing, in preference, ſuch ſituations as repeat an echo, and carefully obſerving to expoſe it to the morning ſun. Having employed ſuch precautions, he takes his ſtation in the vicinity,

vicinity, againſt the trunk of a tree; and there, confounded with the colour of it's bark, and motionleſs, he becomes inviſible. But he preſently animates the obſcure retreat which he has choſen, by the divine melody of his ſong, and effaces all the brilliancy of plumage, by the charms of his muſic.

But whatever enchantment may be diffuſed by plants and animals over the ſituations which have been aſſigned to them by Nature, I never can conſider a landſcape as poſſeſſing all it's beauty, unleſs I perceive in it, at leaſt, one little hut. The habitation of Man confers, on every ſpecies of vegetable, a new degree of intereſt or of majeſty. Nothing more is neceſſary, in many caſes, than a tree, in order to characterize, in a country, the wants of whole Nation, and the care of Providence. I love to ſee the family of an Arab under the date-tree of the deſert, and the boat of an iſlander of the Maldivias loaded with cocoa-nuts, under the cocoa-trees of their gravelly ſtrands. The hovel of a poor un-induſtrious Negro gives me pleaſure, under the ſhade of a great gourd-plant, which exhibits his complete ſet of houſhold furniture. Our magnificent hotels, in great cities, are the habitations of tradeſmen merely: in the country, they are transformed into caſtles, palaces, temples. The long avenues which announce them confound

themſelves with thoſe which form the communication of empires. This is not, in truth, what I conſider as moſt intereſting in rural ſcenery. To the moſt oſtentatious exhibition of ſplendor, I have frequently preferred the view of a little hamlet of fiſhermen, built by the ſide of a river. With inexpreſſible delight have I ſometimes repoſed, under the ſhade of the willows, and of the poplars, on which were ſuſpended the bow-nets, compoſed of their own branches.

I ſhall now proceed, in my uſual ſuperficial manner, to take a rapid glance of the harmonies of plants with Man; and, in order to introduce, at leaſt, ſomething of order into a ſubject ſo rich in matter, I ſhall farther divide thoſe harmonies, relatively to Man himſelf, into *elementary*, into *vegetable*, into *animal*, and into *human*, properly ſo called, or *alimentary*.

HUMAN HARMONIES OF PLANTS.

Elementary Harmonies of Plants relatively to Man.

If we conſider the vegetable Order under the ſimple relations of ſtrength and magnitude, we ſhall find it divided, with a ſufficient degree of generality, into three great claſſes, namely, into herbs, into ſhrubs, and into trees. It is to be remarked, in the firſt place, that herbs are of a ſubſtance pliant and ſoft. Had they been ligneous and hard, like the young boughs of trees, to which it might appear they ought naturally to have a reſemblance, as they grow on the ſame ſoil; the greateſt part of the Earth would have been inacceſſible to the foot of Man, till the fire, or the hatchet, had cleared the way for him. It was not by chance, therefore, that ſo many graſſes, moſſes, and herbs, aſſumed a ſoft and yielding texture, nor from want of nouriſhment, nor of the means of expanſion; for ſome of thoſe herbs riſe to a very great height, ſuch as the banana of India, and ſeveral ferulaceous plants of our own climates, which attain the ſtature of a little tree.

On the other hand, there are ligneous ſhrubs, which do not exceed the generality of herbs in height;

height; but they grow, for the moſt part, on rugged and ſteep places, affording to Man the means of clambering up with facility, for they ſhoot out of the very clefts of the rocks. But as there are rocks which have no clefts, and which preſent the perpendicularity of a wall, there are likewiſe creeping plants which take root at their baſes, and which, fixing themſelves to their ſides, riſe in cloſe coheſion to a height ſurpaſſing that of many of the talleſt trees: ſuch are the ivy, the virgin-vine, and a great number of the *lianne* tribe, which mantle along the rocks of ſouthern regions.

Were the Earth covered with vegetables of this ſort, it would be impoſſible to walk over it. It is very remarkable, that when uninhabited iſlands were diſcovered, ſome were found clothed with foreſts, as the Iſland of Madeira; others in which there was nothing but herbage and ruſhes, as the Malouine Iſlands, at the entrance of Magellan's Strait; others carpeted with moſſes ſimply, ſuch as ſeveral little iſles on the coaſt of Spitzbergen; others, in great number, on which theſe ſeveral vegetables were blended; but I do not know of a ſingle one which was found to contain only ſhrubbery and liannes. Nature has placed this claſs only on places not eaſily to be ſcaled, in order to facilitate acceſs to Man. It may be affirmed, that

no

no precipice presents a surface so perpendicular as to be insurmountable, with their assistance. Thus aided, the ancient Gauls were on the point of storming the capitol.

As to trees, though they are replenished with a vegetative force, which elevates them to a very considerable height, the greater part of them do not send out their first branches but at a certain distance from the ground. So that though they form, when they have attained a certain degree of elevation, an intertexture impenetrable to the Sun, which they extend to a great distance around, they leave, however, about their roots, avenues sufficient to render them accessible, so that the forests may be traversed with ease and expedition.

Such, then, are the general dispositions of vegetables upon the Earth, relatively to the occasion which Man had to range over it. The herbage serves as a carpet to his feet; the shrubbery as a scaling ladder to his hands; and the trees are as so many parasols over his head. Nature, after having established those proportions between them, has distributed them in all the varieties of situation, by bestowing on them, abstractedly from their particular relations to the elements, and to the animal creation, qualities the best adapted to minister to the necessities of Man, and to com-

penſate, in his favour, the inconveniences of cli-mate.

Though this manner of ſtudying her Works be now held in contempt by moſt Naturaliſts, to it, however, ſhall our reſearches be limited. We have juſt been conſidering plants according to their ſhape and ſize, after the manner of gardeners; we proceed farther to examine them as is done by the wood-feller, the huntſman, the carpenter, the fiſherman, the ſhepherd, the ſailor, nay, the noſe-gay-maker. It is of ſmall importance whether we are learned, provided we ceaſe not to be men.

It is in the countries of the North, and on the ſummit of cold mountains, that the pine grows, and the fir, and the cedar, and moſt part of reſi-nous trees, which ſhelter man from the ſnows by the cloſeneſs of their foliage, and which furniſh him, during the Winter ſeaſon, with torches, and fuel for his fire-ſide. It is very remarkable, that the leaves of thoſe ever-green trees are filiform, and extremely adapted, by this configuration, which poſſeſſes the farther advantage of reverbe-rating the heat, like the hair of animals, for reſiſt-ance to the impetuoſity of the winds, that beat with peculiar violence on elevated ſituations. The Swediſh Naturaliſts have obſerved, that the fatteſt pines are to be found on the dryeſt and moſt ſandy

regions

regions of Norway. The larch, which takes equal pleasure in the cold mountains, has a very resinous trunk.

Mathiola, in his useful commentary on *Dioscorides*, informs us, that there is no substance more proper than the charcoal of these trees, for promptly melting the iron minerals, in the vicinity of which they peculiarly thrive. They are, besides, loaded with mosses, some species of which catch fire from the slightest spark. He relates, that being obliged, on a certain occasion, to pass the night in the lofty mountains of the Strait of Trento, where he was botanizing, he found there a great quantity of larches (*larix*) bearded all over, to use his own expression, and completely whitened with moss. The shepherds of the place, willing to amuse him, set fire to the mosses of some of those trees, which was immediately communicated with the rapidity of gunpowder touched with the match. Amidst the obscurity of the night, the flame and the sparks seemed to ascend up to the very Heavens. They diffused, as they burnt, a very agreeable perfume. He farther remarks, that the best agaricum grows upon the larch, and that the arquebusiers of his time made use of it for keeping up fire, and for making matches. Thus Nature, in crowning the summit of cold and ferruginous mountains with those vast vegetable torches, has placed the match in

in their branches, the tinder at their foot, and the ſteel at their roots.

To the South, on the contrary, trees preſent, in their foliage, fans, umbrellas, paraſols. The latanier carries each of it's leaves plaited as a fan, attached to a long tail, and ſimilar, when completely diſplayed, to a radiating Sun of verdure. Two of thoſe trees are to be ſeen in the Royal-Garden. The leaf of the banana reſembles a long and broad girdle, which, undoubtedly, procured for it the name of Adam's fig-tree. The magnitude of the leaves of ſeveral ſpecies of trees increaſes in proportion as we approach the Line. That of the cocoa-tree, with double fruit, of the Sechelles Iſlands, is from twelve to fifteen feet long, and from ſeven to eight broad. A ſingle one is ſufficient to cover a numerous family. One of thoſe leaves is, likewiſe, to be ſeen in the Royal Cabinet of Natural Hiſtory. That of the talipot of the Iſland of Ceylon is of nearly the ſame ſize.

The intereſting and unfortunate *Robert Knox*, who has given the beſt account of Ceylon which I am acquainted with, tells us, that one of the leaves of the talipot is capable of covering from fifteen to twenty perſons. When it is dry, continues he, it is at once ſtrong and pliant, ſo that you may fold and unfold it at pleaſure, being naturally plaited

plaited like a fan. In this ſtate it is not bigger than a man's arm, and extremely light. The natives cut it into triangles, though it is naturally round, and each of them carries one of thoſe ſections over his head, holding the angular part before, in his hand, to open for himſelf a paſſage through the buſhes. The ſoldiers employ this leaf as a covering to their tents. He conſiders it, and with good reaſon, as one of the greateſt bleſſings of Providence, in a country burnt up by the Sun, and inundated by the rains, for ſix months of the year.

Nature has provided, in thoſe climates, paraſols for whole villages; for the fig-tree, denominated, in India, the fig-tree of the Banians, a drawing of which may be ſeen in *Tavernier*, and in ſeveral other travellers, grows on the very burning ſand of the ſea-ſhore, throwing, from the extremity of it's branches, a multitude of ſhoots, which drop to the ground, there take root, and form, around the principal trunk, a great number of covered arcades, whoſe ſhade is impervious to the rays of the Sun.

In our temperate climates, we experience a ſimilar benevolence on the part of Nature. In the warm and thirſty ſeaſon, ſhe beſtows upon us a variety of fruits, repleniſhed with the moſt refreſhing juices,

juices, ſuch as cherries, peaches, melons; and, as Winter approaches, thoſe which warm and comfort by their oils, ſuch as the almond and the walnut. Certain Naturaliſts have conſidered even the ligneous ſhells of theſe fruits, as a preſervative againſt the cold of the gloomy ſeaſon; but theſe are, as we have ſeen, the means of floating and of navigating. Nature employs others, with which we are not acquainted, for preſerving the ſubſtances of fruits, from the impreſſions of the air. For example, ſhe preſerves, through the whole Winter, many ſpecies of apples and pears, which have no other covering than a pellicle ſo very thin, that it is impoſſible to determine how fine it is.

Nature has placed other vegetables in humid and in dry ſituations, the qualities of which are inexplicable on the principles of our Phyſics, but which admirably harmonize with the neceſſities of the men who inhabit thoſe places. Along the water-ſide grow the plants and the trees which are the dryeſt, the lighteſt, and, conſequently, the beſt adapted to the purpoſe of croſſing the ſtream. Such are reeds, which are hollow, and ruſhes, which are filled with an inflammable marrow. It requires but a very moderate bundle of ruſhes to bear the weight of a very heavy man upon the water. On the banks of the lakes of the North are produced thoſe enormous birch-trees, the bark of a ſingle

one

one of which is ſufficient to form a large canoe. This bark is ſimilar to leather in pliancy, and ſo incorruptible by humidity, that, in Ruſſia, I have ſeen ſome of it extracted from under the earth which covered powder magazines, perfectly ſound, though it had lain there from the time of *Peter* the Great.

If we may depend on the teſtimony of *Pliny* and of *Plutarch*, there were found at Rome, four hundred years after the death of *Numa*, the books which that great King had commanded to be depoſited with his body in the tomb. The body was entirely conſumed; but the books, which treated of Philoſophy and Religion, were in ſuch a ſtate of preſervation, that *Petilius*, the Pretor, undertook to read them, by command of the Senate. On the report which he made reſpecting their contents, they were ordered to be burnt. They were written on the bark of the birch-tree. This bark conſiſts of an accumulation of ten or twelve ſheets, white and thin, like paper, the place of which it ſupplied to the ancients.

Nature preſents to Man different trajectiles on different ſhores. She has planted, on the banks of the rivers of India, the bamboo, an enormous reed, which riſes there ſometimes to the height of ſixty feet, and ſwells to the ſize of a man's thigh. The

The part comprehended between two of it's joints is ſufficient to bear a man up on the water. The Indian places himſelf upon it a-ſtraddle, and ſo croſſes a river, ſwimming along by the motion of his feet. The Dutch Navigator, *John Hugo de Linſchotten*, an author of reputation, aſſures us that the crocodile never touches perſons who are paſſing rivers in this manner, though he frequently attacks canoes, and even the boats of Europeans. *Linſchotten* aſcribes the abſtinence of this voracious animal to an antipathy which he has to that ſpecies of reed.

Francis Pyrard, another traveller, who has obſerved Nature with a careful eye, informs us, that there grows, on the ſhores of the Maldivia Iſlands, a tree called *candou*, the wood of which is ſo light, that it ſerves as cork for the fiſhermen *. I think I was once poſſeſſed of a log of wood of that ſpecies. It was ſtripped of the bark, perfectly white, of the thickneſs of my arm, about ſix feet long, and ſo light, that I could eaſily lift it by my finger and thumb. In theſe ſame iſlands, and on the ſame ſtrands, riſes the cocoa-tree, which there attains a higher degree of beauty than any where elſe in the World. Thus, the tree of all others moſt uſeful to mariners, grows on the ſhores of the Seas

* See *Pyrard*'s Voyage to the Maldivia Iſlands, page 38.

moſt

moſt frequented by men of that deſcription.* All the world knows that the veſſel is there conſtructed of it's timber, that it's leaves are formed into ſails, that the trunk ſerves for a maſt, that the hempen ſubſtance called *caira*, which ſurrounds it's fruit, is wrought into cordage, and when the whole is ready for ſea, a cargo of cocoa-nuts is the lading. It is farther remarkable, that the cocoa-nut, before it comes to perfect maturity, contains a liquor which is an excellent antiſcorbutic.

Is it not, then, a miracle of Nature, that this fruit, repleniſhed with ſuch milk, ſhould come to perfection on the barren ſtrand, and within the waſhing of the briny Deep? Nay, it is only on the brink of the Sea, that the tree which bears it arrives at it's higheſt beauty; for few are to be ſeen in the interior of countries.

Nature has placed a palm-tree of the ſame family, but of a different ſpecies, on the ſummit of the mountains of the ſame climates: it is the palmiſt.* The ſtem of this tree is ſometimes above a hundred feet high, is perfectly ſtraight, and bears on it's ſummit, all the foliage which it has, a bunch of palms, from the midſt of which iſſues a long roll of plaited leaves, reſembling the ſtaff of a lance. This roll contains, in a ſort of coriaceous ſheath, leaves ready to ſhoot, which are very good

good eating before their expanſion. The trunk of the palmiſt is woody only at the circumference, and it is ſo hard as to reſiſt the edge of the beſt tempered hatchet. It may be cleft, with the utmoſt eaſe, from end to end, and is filled, inwardly, with a ſpongy ſubſtance, which may be eaſily ſeparated. Thus prepared, it ſerves to form, for conducting waters, frequently diverted from their courſe by the rocks which are at the ſummit of mountains, tubes which are not corruptible by humidity. Thus the palm-tree gives to the inhabitants of thoſe regions the means of conſtructing aqueducts at the ſource of rivers, and ſhips at the place of their diſcharge.

Other ſpecies of trees render them the ſame ſervices, in other ſituations. On the ſhores of the Antilles Iſlands grows the *acajou*, there called, but improperly, the cedar, on account of it's incorruptibility. It arrives at ſuch a prodigious ſize, that out of one log of it they make a boat capable of carrying ſo many as forty men *. This tree poſſeſſes another quality, which, in the judgment of the beſt obſervers, ought to render it invaluable for the marine ſervice; namely this, that it is the only one, of thoſe ſhores, which is never attacked by the ſea-worm, an inſect ſo formidable to every

* Conſult Fathers *Labat* and *Du Tertre*.

other

other ſpecies of timber which floats in thoſe ſeas, that it devours whole ſquadrons in a very little time, and, in order to preſerve them, lays us under the neceſſity, theſe many years paſt, of ſheathing their bottoms with copper. But this beautiful tree has found enemies more dreadful than the worm, in the European inhabitants of thoſe Iſlands, who have almoſt extirpated the whole race of them.

The manner in which Providence has contrived a ſupply for the thirſt of Man, in ſultry places, is no leſs worthy of admiration. Nature has placed, amidſt the burning ſands of Africa, a plant whoſe leaf, twiſted round like a cruet, is always filled with a large glaſs-full of freſh-water; the gullet of this cruet is ſhut by the extremity of the leaf itſelf, ſo as to prevent the water from evaporating. She has planted on ſome parched diſtricts of the ſame country, a great tree, called by the Negroes *Boa.* the trunk of which, of a prodigious bulk, is naturally hollowed like a ciſtern. In the rainy ſeaſon it receives it's fill of water, which continues freſh and cool, in the greateſt heats, by means of the tufted foliage which crowns it's ſummit. Finally, ſhe has placed vegetable fountains on the parched rocks of the Antilles. There is commonly found there a lianne, called the water lianne, ſo full of ſap, that if you cut a ſingle branch of it, as much

water is immediately discharged as a man can drink at a draught: it is perfectly pure and limpid.

In the swamps of the Bay of Campeachy, travellers find relief of another kind. Those swamps, on a level with the Sea, are almost entirely inundated in the rainy season, and became so parched on the return of dry weather, that many huntsmen who had happened to miss their way in the forests, with which they are covered, actually perished with thirst. The celebrated traveller *Dampier* relates, that he several times escaped this calamity, by means of a very extraordinary species of vegetation, which had been pointed out to him on the trunk of a kind of pine very common there; it resembles a packet of leaves, piled one over another in tiers; and, on account of it's form, and of the tree on which it grows, he calls it the pine-apple. This apple is full of water, so that on piercing it at the basis with a knife, there immediately flows from it a good pint of very clear and wholesome water. Father *du Tertre* informs us, that he has several times found a similar refreshment in the leaves, rounded like a cornet, of a species of balizier, which grows on the sandy plains of Guadaloupe. I have been assured by many of our sportsmen, that nothing was more proper for the quenching of thirst than the leaves of the mistletoe, which grows on many trees.

Such

Such are, in part, the precautions employed by Providence for compenſating, in favour of Man, the inconveniencies of every climate; by oppoſing to the qualities of the elements, contrary qualities in vegetables. I ſhall purſue them no farther, for I believe the ſubject to be inexhauſtible. I am perſuaded, that every Latitude, and every ſeaſon, has it's own, which are appropriated to it, and that every parallel varies them in every degree of Longitude.

Vegetable Harmonies of Plants with Man.

Were we now to examine the vegetable relations of plants to Man, we ſhould find them to be infinite in number; they are the perpetual ſources of our arts, of our manufactures, of our commerce, and of our enjoyments; but, in our uſual way, we ſhall juſt run over a few of their natural and direct relations, with which Man has intermingled nothing of his own.

To begin with their perfumes, Man appears to me the only being, endowed with ſenſibility, who is affected by theſe. Animals, it is granted, and eſpecially bees and butterflies, have certain plants proper to themſelves, which attract or repel them by their emanations; but theſe affections

ſeem to be connected with their neceſſities. Man alone is ſenſible to the perfume and luſtre of flowers, independantly of all animal appetite. The dog himſelf, who, from his domeſtic habits, aſſumes ſo powerful a tincture of the manners and of the taſtes of Man, appears totally inſenſible to that enjoyment. The impreſſion which flowers make upon us, ſeems connected with ſome moral affection; for there are ſome which enliven us, whereas others diſpoſe us to melancholy, without our being able to aſſign any other reaſons for it than thoſe which I have endeavoured to unfold, in examining ſome general Laws of Nature.

Inſtead of diſtinguiſhing them as yellow, red, blue, violet, we might divide them into gay, into ſerious, into melancholy: their character is ſo expreſſive, that lovers, in the Eaſt, employ their ſhades to deſcribe the different degrees of their paſſion. Nature makes frequent uſe of it, relatively to us, with the ſame intention. When ſhe wants to keep us at a diſtance from a marſhy and unwholeſome place, ſhe ſcatters there poiſonous plants, which preſent dingy colours, and offenſive ſmells. There is a ſpecies of arum, which grows in the moraſſes of Magellan's Strait, whoſe flower exhibits the appearance of an ulcer, and exhales an odour ſo ſtrong of putrid fleſh, that the fleſh-fly reſorts to it to depoſit her eggs.

But

But the number of fetid plants is of no great extent. The Earth is clothed with flowers which, for the moſt part, have very pleaſing hues and perfumes. I wiſh time would permit me to ſay ſomething of the ſimple aggregation of flowers. This ſubject is ſo vaſt, and ſo rich, that I heſitate not to affirm, that it preſents ample employment for the moſt famous Botaniſt in Europe, through his whole life, by diſcovering to him every day ſome new beauty, and that without removing above a league from his own habitation. All the art with which jewellers diſpoſe their gems diſappears before that which Nature diſplays in the aſſortment of flowers.

I ſhewed *J. J. Rouſſeau* the flowers of different trefoils, which I had picked up, as I was walking with him: ſome of them were diſpoſed in crowns, in half-crowns, in ears, in ſheaves, with colours endleſsly varied. While they were yet on their ſtems, they had beſides other aggregations, with the plants which were frequently oppoſed to them, in colours and in forms. I aſked him, whether Botaniſts gave themſelves any trouble about thoſe harmonies: he told me no; but that he had adviſed a young Painter, of Lyons, to learn Botany, with a particular view to ſtudy in it the forms and the aſſemblages of flowers; and that he had thus become one of the moſt celebrated pattern-drawers in Eu-

rope. On this ſubject, I quoted to him a paſſage from *Pliny*, with which he was highly delighted: it relates to a Painter of Sicyon, named *Pauſias*, who learned, by means of this ſtudy, to paint flowers at leaſt as well as he of Lyons knew how to draw them: he had, in truth, a maſter as ſkilful as Nature herſelf, or rather one and the ſame with her, namely, Love.

I ſhall give this ſtory in the ſimplicity of ſtyle of the old Tranſlator of *Pliny*, in order to preſerve all it's vivacity *. "In his youth he became enamoured of a noſegay girl, of the ſame city with himſelf; her name was Glycera; ſhe was very pretty, and had a ſingularly elegant taſte in aſſorting, a thouſand different ways, the flowers of noſegays and chaplets; ſo that *Pauſias*, copying after Nature the chaplets and noſegays of his miſtreſs, rendered himſelf, at length, perfect in that art. Laſt of all, he painted her ſeated, in the action of compoſing a chaplet of flowers; and this picture is conſidered as his great maſterpiece: he called it *Stephano-Plocos*, the garland-weaver, becauſe *Glycera* had no other means of relieving the preſſure of poverty, but making and ſelling garlands and noſegays. And it is confidently affirmed, that *L. Lucullus* gave to

* *Pliny*'s Natural Hiſtory, book xxxv. chap. ii.

" *Dionyſius*,

"*Dionysius*, of Athens, two talents, for a simple "copy of this picture."

This anecdote must have been singularly pleasing to *Pliny*, for he has repeated it in another place *: "Those of Peloponesus," says he, "were "the first who regulated the colours and the "smells of the flowers of which chaplets were "composed. It was, however, originally the in-"vention of *Pausias*, a Painter, and of a nosegay-"girl, named *Glycera*, with whom he was vio-"lently in love; whence he was engaged to imi-"tate to the life the chaplets and nosegays which "she composed. But the girl varied in so many "ways the arrangement of the flowers of her chap-"lets, in order to teize and employ her lover, that "it afforded very high amusement to behold the "skill of the Painter *Pausias*, and the natural pro-"duction of *Glycera*, striving for the superiority."

Ancient Nature is still better acquainted with the subject, than is the young *Glycera*. As it is impossible to follow her in her infinite variety, we shall make, at least, one observation respecting her regularity. It is this, that there is not any one odoriferous flower, but what grows at the foot of Man, or at least within reach of his hand. All

* Idem, book xxi. chap. 2.

those of this description are placed on herbage, or on shrubbery, as the heliotrope, the pink, the gillyflower, the violet, the rose, the lilach. Nothing similar to these grows on the lofty trees of our forests; and if some flowers of brilliant appearance are displayed on certain tall trees of foreign countries, such as the tulip-tree, and the great chestnut of India, they have no very pleasant smell. Some trees of India, it is admitted, as the spice-bearing plants, are perfumed all over; but their flowers are not very showy, and do not partake of the odour of their leaves. The flowers of the cinnamon tree smell like human excrement: this I know to be true by experience; if, however, the trees which were shewed to me in the Isle of France, in a plantation belonging to Mr. *Magon*, were the real cinnamon. The beautiful and fragrant flower of the magnolia grows on the lower part of the plant. Besides, the laurel which bears it is, as well as spice-trees, a plant of no great elevation.

It is possible I may be mistaken in some of my observations; but supposing them multiplied, with respect to the same object, and attested by persons of veracity, and exempted from the spirit of system, I am able to deduce general consequences from them, which ought not to be a matter of indifference to the happiness of Mankind, by demonstrating

monftrating to him the invariable intentions of benevolence in the AUTHOR of Nature. The varieties of their adaptation reflect mutual light; the means are different, but the end is conftantly the fame. The fame goodnefs which has placed the fruit deftined for the nourifhment of Man, within reach of his hand, muft have likewife difpofed his nofegay with fimilar attention to his conveniency. It may be here remarked, that our fruit-trees are eafily fcaled, and different, in this refpect, from moft foreft-trees. Farther, all thofe which produce fruits that are foft, when in a ftate of perfect maturity, and which would have been liable to be bruifed in falling, fuch as the fig-tree, the mulberry, the plumb, the peach, the apricot, prefent their crop at a fmall diftance from the ground: thofe, on the contrary, which yield hard fruit, and fuch as have nothing to rifk from falling far, carry it aloft, as walnut-trees, cheftnuts, and cocoas.

There is no lefs marveloufnefs of adaptation in the forms and fizes of fruits. Many of them are moulded for the mouth of Man, fuch as cherries and plumbs; others for his hand, fuch as pears and apples; others much larger, fuch as melons, have the fub-divifions marked, and feem deftined to be a focial family repaft: nay, there are fome in India, as the jacq, and with ourfelves the pum-

pion, large enough to be divided among a neighbourhood. Nature appears to have obferved the fame proportions in the various fizes of the fruits deftined to the nutriment of Man, as in the magnitude of the leaves which are defigned to afford him a fhade in hot countries; for of thefe fome are contrived to be a fhelter for a fingle perfon, others for a whole family, and others for all the inhabitants of the fame hamlet.

I fhall not dwell long on the other relations which plants have with the habitation of Man, from their greatnefs and their attitude, though many very curious obfervations might be fuggefted on that fubject. There are few of them but what are capable of embellifhing his field, his roof, or his wall. I fhall only remark, that the vicinity of Man is beneficial to many plants. An anonymous miffionary relates, that it is firmly believed by the Indians, that the cocoa-trees which have houfes around their roots, become much more beautiful than thofe where there are none; as if that ufeful tree took delight in being near the habitation of Man.

Another miffionary, a bare-footed Carmelite, called Father *Philippe*, pofitively afferts, that when the cocoa-tree is planted clofe by houfes or huts, it is rendered more fruitful by the fmoke, by the

afhes,

ashes, and other circumstances connected with a human dwelling, so as to produce double the quantity of fruit. He adds, that, for this reason, the places in India which consist of palm-plantations, are crowded with houses and little cabins; and that the proprietors of those plantations give, at first, a pecuniary premium, as an inducement to come and live there, together with part of the crop when it is reaped. He farther adds, that though their fruits, which are very large and hard, frequently fall down from the trees, when they have attained a state of full maturity, either by the gnawing of the rats, or by the violence of the winds, there is not a single instance known of any person's being hurt by the fall. This appears to me no less extraordinary than it did to him *.

I might extend the influences of Man to several of our fruit-trees, especially the apple-tree and the vine. I never saw finer apple-trees in the Païs de Caux, than those which grow around the habitations of the peasantry. It is true that the attention of the proprietor may have greatly contributed to this. I have sometimes felt myself stopped in the streets of Paris, to contemplate with delight small vines, the roots of which are in the sand,

* See Voyage to the East, of R. P. *Philippe*, a white friar Book vii. chap. 5. section 4.

and

and under the pavement, enriching with their clusters the complete front of a guard-house. One of them, I think about six or seven years ago, produced two crops in one year, as was announced in the public prints.

Animal Harmonies of Plants with Man.

But Nature was not satisfied with having given to Man a bower, and a carpet, loaded with fruit; this would not have availed him, had she not likewise furnished him, in the vegetable order itself, the means of defence against the depredations of wild beasts. In vain would he have watched over the preservation of his property through the day, had it been exposed to pillage during the night. She has bestowed a prickly shrubbery to enclose him round and round. The farther we advance southward, we find the greater variety in the species of these. But, on the contrary, we see few, if any, of those thorny shrubs in the North, where they appear useless; there being no orchards to defend. They seem to be produced, in both Indies, for every kind of situation. Though I have been only on the selvage, as I may say, of those countries, I have seen there a great number of such shrubs, the study of which presented a great variety of curious remarks to a Naturalist.

Among

Among others, I took particular notice of one, in a garden on the Isle of France, which to me appeared proper for composing a fence impenetrable to the smallest of quadrupeds. It rises in form of a stake, about the thickness of a man's arm, quite straight, without branches, and bearing no verdure except a small bunch of leaves on it's summit. It's bark is bristled all over with very strong, and very sharp prickles. It attains the height of seven or eight feet, and grows as thick above as below. A series of these shrubs, planted close to each other, would form a real pallisado, without the smallest interval. The opuntia and the taper, so common under the Torrid Zone, are armed with prickles so keen, that they pierce the soles of your shoes if you venture to walk over them. There is not a tyger, or lion, or elephant, that dares to approach them. There is another species of thorn, in the Island of Ceylon, which is employed as a defence against Man himself, accustomed as he is to force his way through every obstacle. *Robert Knox*, whom I have before quoted, informs us, that the avenues of the kingdom of Candy, in the Island of Ceylon, are blockaded only with faggots of those thorns, with which the inhabitants obstruct the passes of their mountains.

Man finds in vegetables, protection, not only against ferocious animals, but against reptiles and insects.

infects. Father *du Tertre* tells us, that he one day found, in the Ifland of Guadaloupe, at the foot of a tree, a creeping plant, the ftem of which prefented the figure of a ferpent. But he was much more furprized on perceving feven or eight fnakes lying dead around it. He communicated this difcovery to a medical man, who, by means of it, performed many wonderful cures, by employing it in the cafes of perfons bitten by thofe dangerous reptiles. It is generally diffufed over the reft of the Antilles Iflands, in which it is known by the name of fnake-wood. It is likewife found in the Eaft-Indies. *John Hugo de Linfchotten* afcribes to it the fame figure, and the fame qualities.

We have, in our own climates, vegetables which prefent very ftrange correfpondencies and contrafts with reptiles. *Pliny* tells us, that ferpents are very fond of the juniper and the fennel, but that they are rarely found under the fern, the trefoil, the afh-weed, and the rue; and that betony kills them. Other plants, as has already been mentioned, deftroy flies, fuch as certain fpecies of the dionæa. *Thevenot* affures us, that in the Indies, grooms defend their horfes from the flies, by rubbing them every morning with the flowers of the pumpion. The fleabane, which bears black and fhining grains, refembling a flea, clears the houfe of that vermin, if *Diofcorides* is to be credited.

The

The echium, which has it's ſeed formed like the head of a viper, is fatal to thoſe reptiles. It is probable, that, from ſuch configurations, men, in the earlier ages of the World, diſcovered the relations and the oppoſitions between plants and animals. I am diſpoſed to believe, that each genus of inſect has it's deſtructive vegetable with which we are unacquainted. In general, all vermin ſhuns perfume.

Nature has farther given us, in plants, the firſt patterns of nets for hunting and fiſhing. There grows on certain heaths in China, a ſpecies of ratan, ſo interwoven and ſo ſtrong, as to catch and hold faſt the ſtag, though in full vigour. I myſelf have ſeen on the ſands of the ſea-ſhore in the Iſle of France, a ſpecies of lianne, called the falſe-potatoe, which covers whole acres, like a vaſt fiſhing net. It is ſo perfectly adapted to this very purpoſe, that the Negroes actually employ it in fiſhing. They form, with the ſtems and foliage of it, a very long ſeries of cordages, which they caſt into the ſea; and having diſpoſed them in a chain encompaſſing a great ſpace on the water, they draw it aſhore by the two extremities. They ſcarcely ever fail to bring out fiſh *, for the fiſhes are terrified, not only by a net which encloſes them, but

* See *Francis Pyrard*'s Voyage to the Maldivias.

by

by every unknown ſubſtance which forms a ſhade on the ſurface of the water. By employing an induſtry equally ſimple, and nearly ſimilar, the inhabitants of the Maldivia Iſlands carry on fiſheries to a prodigious extent, employing no other means to decoy the fiſh into their receptacles, except a cord floating on the water, with the help of ſticks.

Human, or elementary Harmonies of Plants.

There is not a ſingle plant on the face of the Earth, but what has certain relations to the neceſſities of Man, and which does not ſerve, ſomewhere or another, for clothing to him, for a ſhelter, for pleaſure, for medicine, or, at leaſt, for fuel. Some, which with us are entirely uſeleſs, are in high eſtimation in other parts of the World. The Egyptians put up frequent and fervent prayers for a plentiful crop of nettles, from the ſeeds of which they extract an oil, while the ſtem furniſhes them with a thread, which they weave into excellent cloth. But thoſe general relations, being innumerable, I ſhall confine myſelf to a few particular obſervations, reſpecting the plants which miniſter to the firſt of human wants, I mean the food of Man.

We

We remark, first, that corn, which ſerves for the general ſubſiſtence of the Human Race, is not produced by vegetables of a lofty ſtature, but by ſimple graſſes. The principal ſupport of human life is borne on herbage, and is expoſed to the mercy of every breath of wind. There is reaſon to believe, that had we ourſelves been intruſted with the ſafety of our crops, we would not have failed to place them on great trees; but in this, as well as in every thing elſe, we are bound to admire Divine Providence, and to miſtruſt our own wiſdom. Had our harveſts been the produce of the foreſts, in the event of theſe being deſtroyed by war, or ſet on fire through our own imprudence, or rooted up by the winds, or ravaged by inundations, whole ages would have been requiſite to re-produce them in a country. Farther, the fruits of trees are much more liable to drop off, than the ſeeds of graſſes. The graſſes, as has been already obſerved, carry their flowers in an ear, in many caſes ſurmounted by little beards, which do not defend their ſeeds from the birds, as *Cicero* ſays, but which ſerve, as ſo many little roofs, to ſhelter them from the water which falls from Heaven. The drops of the rain cannot drown them, as they do flowers radiated, in diſks, in roſes, and in umbels, the forms of which, however are adapted to certain places and to certain ſeaſons; but thoſe of the graſſes are adapted to every expoſure.

When

When they are borne in flowing and drooping plumes, ſuch as thoſe of moſt graſſes of hot countries, they are ſheltered from the heat of the Sun; and when collected into an ear, as thoſe of moſt graſſes of cold countries, they reflect his rays on at leaſt one ſide. Farther, by the ſuppleneſs of their ſtems, ſtrengthened by joints from diſtance to diſtance, and by their filiform and capillaceous leaves, they eſcape the violence of the winds. Their weakneſs avails them more than ſtrength does the great trees. Like ſmall fortunes, they are re-ſown and multiplied, by the very ſame tempeſts which lay waſte the vaſt foreſts.

They farther reſiſt the effect of exceſſive dryneſs by the length of their roots, which go, in queſt of moiſture, a great way under ground; and though their leaves are narrow, they have them in ſuch numbers, that they cover the face of the ground with plants endleſsly multiplied. At the ſlighteſt ſhower, you ſee them all rear themſelves into the air, at their extremities, as if they were ſo many claws. They even reſiſt conflagration, which conſumes ſo many trees in the foreſt. I have ſeen countries in which they every year ſet the herbage on fire, in the ſeaſon of drought, re-cover themſelves, as ſoon as it rained, with the moſt lovely verdure. Though this fire be ſo active, as frequently to devour, root and branch, the trees which come into

contact

contact with it, the roots of herbage ſuſtain no great injury from it.

They have, moreover, the faculty of re-producing themſelves in three different ways, by ſhoots which puſh away from their roots, by creeping branches, which they extend to a diſtance, and by grains extremely volatile or indigeſtible, which the winds and the animals ſcatter about on every ſide. The greateſt part of trees, on the contrary, naturally regenerate themſelves only by their ſeeds. Add to the general advantages of graſſes, an aſtoniſhing variety of characters, in their florification and in their attitudes, which renders them more proper than vegetables of every other claſs, to grow in every variety of ſituation.

It is in this coſmopolite family, if I may be allowed the expreſſion, that Nature has placed the principal aliment of Man; for the various ſpecies of corns, on which ſo many human tribes ſubſiſt, are only ſo many ſpecies of graſſes. There is no land on the Globe where ſome kind of corn or another may not be raiſed. *Homer*, who had ſtudied Nature ſo accurately, frequently characterizes each country by the vegetable peculiar to it. One iſland he celebrates for it's grapes, another for it's olive-trees, a third for it's laurels, and a fourth for it's palms; but to the Earth only he gives the general

 epithet

epithet of Ζειδωρα, or corn-giving. Nature, in fact, has formed it for growing in all situations, from the Line to the very border of the Frozen Ocean. One species is adapted to the humid places of warm countries, as the rice of Asia, which grows in vast abundance in the muddy swamps by the side of the Ganges. Another is suited to the marshy grounds of cold countries; such is a kind of false-oats, which naturally grows on the banks of the rivers of North-America, and of which many savage Nations annually raise immense crops *.

Other kinds of corn thrive wonderfully well on warm and dry lands, as the millet and the pannick of Africa, and the maize of Brasil. In our climates, wheat agrees best with a strong soil, rye with a sandy one, buck-wheat with rainy declivities, oats with humid plains, barley with stony ground. Barley succeeds in the very bosom of the North. I have seen, as far up as the sixty-first degree of North-Latitude, amidst the rocks of Finland, crops of this grain as beautiful as ever the plains of Palestine produced.

Corn affords an abundant supply to all the necessities of Man. With it's straw he enjoys the

* Consult Father *Hennepin*, a Franciscan: *Champlain*, and other Travellers through North-America.

means

means of lodging, of covering, of warming himſelf, and of feeding his ſheep, his cow, and his horſe; with it's grain he can compound aliments and liquors of every flavour. The northern Nations brew it into beer, and diſtil from it ſtrong waters, more potent than thoſe from wine; ſuch are the diſtillations of Dantzick. The Chineſe * extract from rice, a wine as agreeable as the beſt wines of Spain. The Braſilians prepare their *ouicou* with maize. In a word, with oats torrefied, it is poſſible to compoſe a cream which ſhall have the perfume of the vanilla. If we unite with theſe qualities thoſe of the other domeſtic plants, moſt of which likewiſe grow all over the Earth, we ſhall find in them the ſavour of the clove, of pepper, of other ſpiceries; and without going farther than our own gardens, we ſhall be able to collect the delicacies ſcattered over the reſt of the vegetable Creation.

We may diſtinguiſh, in the barley and the oats, the elementary characters which have been formerly indicated, and which vary the ſpecies of plants of the ſame genus, in a conformity to the ſituations where they are deſigned to grow. The barley deſtined to dry places has leaves broad and open at their baſe, which convey the rain-water to the root

* Journey to China, by *Iſbrand-Ides.*

 of

of the plant. The long beards which ſurmount the coat that is wrapped round the grain, are briſtled with denticulations, very much adapted to the purpoſe of making them adhere to the hair of animals, and of re-ſowing them in lofty and dry ſituations. The oats, on the contrary, deſtined to humid places, have narrow leaves, gathered cloſe around the ſtem, in order to intercept the rain-water. The coats of this plant diſtended, ſimilar to two long half-bladders, and not very cloſely adhering to the grain, render it proper for floating, and croſſing the water by the help of the winds. But here we are preſented with a ſtill more wonderful fact, which will confirm what has been advanced, reſpecting the uſes of the different parts of plants, relatively to the elements, and which extends the views of Nature even beyond the fructification, though we have conſidered this as the determining character; it is, that barley, in rainy years, degenerates into oats, and that oats, in dry ſeaſons, change into barley.

This obſervation, related by *Pliny*, *Galen*, and *Mathiola*, the Commentator of *Dioſcorides* *, has been confirmed by the experiments of ſeveral modern Naturaliſts. *Mathiola*, indeed, alleges, that this transformation of barley is not into oats pro-

* See *Mathiola* on *Dioſcorides*, book iv. page 432.

perly

perly ſo called, which he denominates *Bromos*, but into a plant which, at firſt ſight, reſembles it, and to which he gives the name of *Ægilops*. This transformation, demonſtrated by the frequently repeated experiments of the huſbandmen of his country, and by that which the father of *Galen* made, expreſsly for his own ſatisfaction; together with that of the flowers of the linarium, and of the leaves of many vegetables, are ſufficient proof, that the elementary relations of plants, are only ſecondary relations, and that animal, or human, relations are the primary. Thus, Nature has placed the character of a plant, not only in the form of the fruit, but in the ſubſtance of that very fruit.

Hence I preſume, that having formed, in general, of a mealy ſubſtance, the baſis of human life, Nature has diffuſed it over all ſituations, on different ſpecies of graſſes; that afterwards, intending to add to this, certain modifications relative to ſome humors of the human temperament, or to ſome influence of ſeaſon, or of climate, ſhe has formed other combinations of it, which ſhe has depoſited in leguminous plants, ſuch as peaſe and beans, which the Romans comprehended in the claſs of corn-plants; that, finally, ſhe has formed another ſort of it, which ſhe has laid up in the fruits of trees, ſuch as cheſtnuts, or in roots,

as potatoes, and other farinaceous under-ground vegetables.

Thofe adaptations of fubftance to every climate are fo infallibly certain, that, in every country, the fruit which is moft common there is the beft, and the moft wholefome. Hence I farther prefume, that fhe has followed the fame plan with refpect to medicinal plants; and that having diffufed over various families of vegetables, virtues relative to our blood, to our nerves, to our humors, fhe has modified them in every Country, conformably to the difeafes which the climate of each particular country generates, and has placed them in oppofition with the particular characters of thofe fame difeafes. It is, in my opinion, from the neglect of thefe obfervations, that fo many doubts and difputes have been excited refpecting the virtues of plants. A fimple, which, in one country, is an infallible cure for a malady, may, fometimes increafe it in another. The Jefuits-powder, which is the pounded bark of a fpecies of frefh-water manglier of Mexico, is a remedy for the fevers of America, of a kind peculiar to damp and hot fituations, but frequently fails when applied to thofe of Europe. Every medicine is modified according to the place, juft as every malady is.

I fhall

I ſhall purſue this reflection no farther, as it would lead me into a deviation from my ſubject; but if Phyſicians would pay the attention to it which it merits, they muſt ſtudy more carefully the plants of their own country, and not prefer to them, as they generally do, thoſe of foreign climates, which they are under the neceſſity of modifying a thouſand different ways, in order to give them, as chance may direct, an adaptation to local maladies. One thing is certain, namely, that when Nature has determined a certain ſavour in any vegetable, ſhe repeats it all over the Earth, with a variety of modifications, which do not, however, prevent our diſtinguiſhing it's principal virtue. Thus, having placed the *cochlearia* (ſcurvy-graſs) that powerful anti-ſcorbutic, even on the foggy ſhores of Spitzbergen, ſhe has repeated the ſavour and the medicinal qualities of it, in the creſſes of our brooks, in the garden creſſes, in the naſturtium, which is a creſs of the rivers of Peru; in a word, in the very grains of the papaya, which grows in humid places of the Antilles Iſlands. We find, in like manner, the ſavour, the ſmell, and the medicinal qualities of our garlic, in the woods, the barks, and the moſſes of America *.

* I muſt here obſerve that garlic, the ſmell of which is ſo formidable to our fine ladies, is, perhaps, the moſt infallible remedy in the World againſt the vapours, and all the nervous diſorders to which women are ſo ſubject. Of this I have had re-

These considerations induce me to believe, that the elementary characters of plants, and their entire configuration are only secondary means, and that their

peated experience. Nay, *Pliny* goes so far as to assure us, that it is a cure for the epilepsy. It is, besides, an antiseptic; and every plant which has it's smell, has also the same virtues. It is very remarkable, that plants which smell like garlic, usually grow in marshy places, as a remedy, provided by Nature, against the putrid emanations thence exhaled. Such is, among others, the *scordium*. *Galen* relates, that it's antiseptic virtue became demonstrable from this, that after a battle, the dead bodies which happened to be in contact with plants of the scordium, were found to be in a much less putrid state than those which were not; and that those bodies remained fresh and sound chiefly in the parts which actually touched the plant. But the experiment which the Baron *Busbequius* made with it, upon living bodies, is still more striking. That great Man, on his return from the first journey which he made to Constantinople, was attended by a numerous retinue. A Turk of his suite was attacked with the plague, and died. His companions resolutely divided his spoils among themselves, in defiance of the remonstrances of the Physician of *Busbequius*, who assured them that the pestilence would thereby be immediately communicated. In fact, a few days after, the symptoms of that dreadful malady became apparent among them.

But let us permit the intelligent and virtuous Ambassador himself to give an account of the consequences of this alarming event. "The day after our departure from Adrianople," says he, "they "all came to him (the Physician) with a sad and dejected air, "complaining of a violent head-ach, and imploring relief. They "were perfectly sensible that they were affected with the first "symptoms of the pestilence. My Physician reprimanded them "severely,

their principal character is referable to the necessities of Man. Thus, in order to establish in plants an order simple and agreeable, instead of running over

" severely, saying he was astonished how they dared to apply to " him for a remedy from an evil of which he had fore-warned " them, and which they had obstinately persisted in bringing upon " themselves. Not, however, that he intended to with-hold any " assistance which might be in his power. On the contrary, he " became extremely uneasy about the means of relieving them: " But where was the possibility of finding medicine on a road " frequently subjected to a failure of the most common necessaries of life? Providence became our only refuge, and we " were effectually succoured in this trying hour. I am going to " relate in what manner.

" It was my custom, on our arrival at the different halting- " places on the road, to go a-walking in the vicinity, and to take " a view of every thing curious. That day I was so fortunate as " to bend my course to an adjacent meadow. My eye happened " to catch sight of a plant with which I was unacquainted; " I picked up some of it's leaves, and put them to my nose: " they smelled of garlic. I handed them to my Physician, asking " him if he knew the plant. After having attentively examined " it, he replied that it was the scordium. He lifted up his hands " to Heaven, and gave thanks to God for the seasonable relief " which He had sent us. He instantly gathered a considerable " quantity, put it into a large kettle, and boiled it thoroughly. " Then, calling for the patients, desired them to take courage, " and, without the loss of a moment, made them drink copiously " of the decoction of that plant, with a slight infusion of the " earth of Lemnos: he then had them well warmed, and put to " bed, desiring them not to go to sleep till they had fallen into a " profuse perspiration, with which they exactly complied. The " next

over ſucceſſively their elementary, vegetable, animal, and human harmonies, it would be more proper to invert this order, but without changing it, and to ſet out with the plants which preſent to Man a ſupply for his firſt wants, to proceed thence to the uſes which animals derive from them, and to conclude with the ſituations which determine their varieties.

This order may be followed ſo much the more eaſily, that the firſt point of departure is fixed by the ſmell and the taſte. The teſtimony of theſe two ſenſes is far from being contemptible; for they aſſiſt us in aſcertaining the intimate qualities of plants, much better than the decompoſitions of Chemiſtry; it may be extended to the whole vegetable kingdom, inaſmuch as there is not a ſingle genus of plants, varied into umbelliferous, roſeformed, papilionaceous, and the reſt, but what preſents food to Man, in ſome part or another of the Globe. The ciperus of Ethiopia bears, at it's root, bulbs which have the taſte of almonds. That which in Italy is called *Traſi* produces bulbs which

"next day they felt themſelves greatly relieved. A ſimilar doſe "was repeated, and the whole ended in a perfect cure. Thus, "through the goodneſs of GOD, we eſcaped a death which ſtared "us immediately in the face." (Letters of the Baron *Buſbequius* "vol. i. page 197 and 198.)

taſte

taste like chestnuts *. We have found, in America, the potatoe in the class of *solana*, which are poisons. It is a jasmine of Arabia, which supplies us with the coffee-berry. The eglantine, with us, produces berries fit only for the use of birds; but that of the Land of Yesso, which grows there among rocks, and the shells on the sea-shore, bears cups so large and so nourishing, that they serve for food to the inhabitants of those shores, for a considerable part of the year †. The ferns of our hills are unproductive; but there grows in North-America a species of this plant, called *Filix baccifera*, loaded with berries, which are very good to eat ‡. The tree itself of the Molucca Islands, called *Libbi* by the inhabitants, and palm-sagoe by travellers, is, in the judgment of our Botanists, merely a fern. This fern contains in it's trunk the sagoe, a substance lighter, and more delicate than rice. In a word, there are even certain species of sea-weed, which the Chinese eat with delight, among others, those which compose the nests of a species of swallow.

By disposing in this order, therefore, the plants which produce the principal subsistence of Man, as

* See the Catalogue of Garden-Plants of Boulogne, by *Hyacinth Ambrosino*

† Consult Collection of Voyages by *Thevenot*.

‡ See Father *Charlevoix*, his History of New France.

as the graſſes, we ſhould have firſt, for our own country; the wheat of ſtrong lands, the rye of the ſands, the barley of the rocks, the oats of humid places, the buck-wheat of rainy declivities; and for other climates and expoſures, the pannic, the millet, the maize, the Canadian oats, the rice of Aſia, ſome ſpecies of which thrive in dry ſituations; and ſo of the reſt.

It would be farther uſeful to aſcertain on the Globe the places to which the ſeveral origin of each alimentary plant might be referred. What I have to advance on this ſubject may be conjecture merely, but it appears to me to have an air of probability. I am of opinion, then, that Nature has placed in iſlands the ſpecies of plants which are moſt beautiful, and beſt adapted to the neceſſities of Man. Firſt, iſlands are more favourable to the elementary expanſions of plants, than the interior of continents, for there is no one but what enjoys the influences of all the elements, being completely ſurrounded by the winds and the ſeas, and frequently in it's interior, poſſeſſing the combined advantages of plains, of ſands, of lakes, of rocks, and of mountains. An iſland is a little world in epitome. Secondly, their particular temperature is ſo varied, that you find of them in all the principal points of Longitude and Latitude, though there be a conſiderable number ſtill unknown to

us,

us, particularly in the South-Seas. Finally, experience demonſtrates, that there is not a ſingle fruit-tree in Europe, but what becomes more beautiful in ſome of the iſlands along it's coaſts, than in the Continent.

I have ſpoken of the beauty of the cheſtnut-trees of Corſica and Sicily: but *Pliny*, who has preſerved to us the origin of the fruit-trees which were in Italy in his time, informs us, that moſt of them had been imported from the iſlands of the Archipelago. The walnut came from Sardinia; the vine, the fig-tree, the olive, and many other fruit-trees, were natives of the other iſlands of the Mediterranean. Nay, he obſerves, that the olive-tree, as well as ſeveral other plants, thrives only in the vicinity of the Sea. All modern travellers confirm theſe obſervations. *Tavernier*, who had ſo many times traverſed the Aſiatic Continent, aſſures us, that no olive-trees are to be ſeen beyond Aleppo. An anonymous Engliſh traveller, whom I have already quoted with approbation, poſitively aſſerts; that no where, on the Continent, are there to be found fig-trees, vines, mulberries, as well as many other fruit-trees, once to be compared, either as to magnitude or fertility, with thoſe of the Archipelago, notwithſtanding the careleſſneſs and indolence of the wretched poſſeſſors. To theſe I might

might add a great many other vegetables, which thrive only in thoſe iſlands, and which furniſh to the commerce of Europe, gums, mannas, and dye-ſtuffs. The apple-tree, ſo common in France, produces no where ſuch fine fruit, and of ſpecies ſo varied, as on the ſhores of Normandy, under the breath of the ſea-breeze from the Weſt. I have no doubt that the fruit which was propoſed as the prize of beauty had, like *Venus* herſelf, ſome favourite iſle.

If we carry our remarks even into the Torrid Zone, we ſhall find that it is neither from Aſia, nor from Africa, that we obtain the clove, the nutmeg, the cinnamon, the pepper of the beſt quality; the benzoin, the ſandal-wood, the ſagoe, and many others, but from the Molucca Iſlands, or from thoſe which are in the ſame ſeas. The cocoa-tree attains it's perfect beauty only in the Maldivia Iſlands. Nay, there are, in the archipelagos of thoſe Seas, a great number of fruit-trees deſcribed by *Dampier*, which have not yet been tranſplanted into the Old Continent; ſuch as the grape-tree. The double cocoa is to be found only in the Sechelles Iſlands. The iſlands recently diſcovered in the South-Sea, ſuch as that of Taïti, have preſented us with trees hitherto unknown, as the bread-fruit, and the mulberry tree, the bark

of

of which serves to make cloth. As much may be said of the vegetable productions of the Islands of America relatively to their Continent.

These observations might be extended even to the very birds and quadrupeds, which are more beautiful, and of species more varied, in islands, than any where else. The elephants held in highest estimation in Asia, are those of the Island of Ceylon. The Indians believe them to be possessed of something divine; nay, more, they allege, that other elephants acknowledge this superiority. One thing is certain, they fetch a higher price all over Asia than any others. In a word, travellers the most worthy of credit, and who have made the most accurate observations, as the English *Dampier*, Father *du Tertre*, and some others, assure us, that there is not a shallow in the seas lying between the Tropics, but what is distinguished by some sort of bird, of crab, of turtle, or of fish, which is no where else to be found, either of species so varied, or in so great abundance. I presume that Nature has thus scattered her choicest benefits over the islands, in order to allure men thither, and to pervade the Earth. These are only conjectures, I grant; but they rarely deceive us when they are founded on the wisdom and goodness of the AUTHOR of Nature.

The

The fineſt ſpecies of corn, therefore, which is wheat, might be referred to Sicily, where, in fact, they pretend it was originally found. Fable has immortalized this diſcovery, by making that iſland the ſcene of the amours of *Ceres*; as well as the birth of *Bacchus*, in the Iſle of Naxos, becauſe of the beauty of it's vines. This much is certain, that corn is no where indigenous but in Sicily, if, however, it ſtill re-perpetuates itſelf there ſpontaneouſly, as the Ancients affirm.

After having determined in the ſame manner, the other human accommodations of the graſſes to different ſituations of ground, we might examine the graſſes which exhibit marked relations to our domeſtic animals, ſuch as the ox, the horſe, the ſheep, the dog. We might characterize them by the names of theſe animals. We ſhould have the *gramen bovinum*, *equinum*, *ovinum*, *caninum*. The different ſpecies of each of theſe genera, might afterwards be diſtinguiſhed by the names of the different places where they are found by the ſeveral animals; on the banks of rivers, among rocks, on ſands, on mountains; ſo that by the addition of the epithets, *fluviatile*, *ſaxatile*, *arenoſum*, *montanum*, you might ſupply, in two words, all the verboſe phraſeology of our botanical compoſitions.

We

We might apportion, in like manner, the other graſſes, to the different quadrupeds of our foreſts, as to the ſtag, to the hare, to the wild boar, and ſo on. Theſe firſt determinations would require certain experiments to be made on the taſtes of animals, but they would be very inſtructive, and highly amuſing. They would have no mixture of cruelty, as moſt of thoſe of our modern phyſics have, by which the wretched animal is flead alive, poiſoned, or ſuffocated, in order to come at the knowledge of it's propenſities. Our experiments would ſtudy their appetites only, and not their convulſions. Beſides, there are a great many of thoſe preferred and rejected plants, already well-known to our ſhepherds. One of them ſhewed me, in the vicinity of Paris, a gramineous plant, which fattens ſheep more in a fortnight, than the other ſpecies can do in two months. The moment, too, that they perceive it, they run after it with the utmoſt avidity. Of this I have been an eye-witneſs. I do not mean, however, to aſſert that each ſpecies of animal limits it's appetite to a ſingle ſpecies of food. It is quite ſufficient, in order to eſtabliſh the order which I am propoſing, that each of them gives, in every genus of plant, a decided preference to ſome one ſpecies; and this is confirmed, beyond all doubt, by experience.

The great clafs of the gramineous plants being thus apportioned to Man and animals, other plants would prefent ftill greater facility in their appropriations, becaufe they are much lefs numerous. Of the fifteen hundred and fifty fpecies of plants, enumerated by *Sebaftian le Vaillant* in the country adjacent to Paris, there are more than a hundred families, among which that of the graffes comprehends, for it's fhare, eighty-five fpecies, exclufive of twenty-fix varieties, and our different forts of corns. It is the moft numerous next to that of mufhrooms, which contains a hundred and ten fpecies, and that of moffes, which contains eighty-fix. Thus, inftead of the fyftematic claffification of botanic Writers, which gives no explanation of the ufes of moft of the vegetable parts, which frequently confounds plants the moft heterogeneous, and feparates thofe of the fame genus, we fhould have an order fimple, eafy, agreeable, and of an infinite extent, which paffing from Man to animals, to vegetables, and to the elements, would difcover to us the plants which ferve to our ufe, and to that of other fenfible Beings, would render to each of them it's elementary relations, to each fite on the Earth it's vegetable beauty, and would replenifh the heart of Man with admiration and gratitude. This plan appears fo much the more conformable to that of Nature, that it is entirely comprehended

prehended in the benediction which it's AUTHOR pronounced upon our first parents, saying unto them *: "Behold, I have given unto you every "herb bearing seed, which is upon the face of all "the Earth, and every tree, in the which is the "fruit of a tree yielding seed, *after it's kind*: to "you it shall be for meat: and to every beast of "the Earth, and to every fowl of the air, and to "every thing that creepeth upon the Earth, "wherein there is life, I have given every green "herb for meat."

This benediction is not confined, as far as Man is concerned, to some primordial species in each genus. It is extended to the whole vegetable kingdom, which converts itself into aliment fit for his use, by means of the domestic animals. *Linnæus* has presented to them, from the eight to the nine hundred plants which Sweden produces, and he remarked that, of these, the cow eats two hundred and eigty-six; the goat, four hundred and fifty-eight; the sheep, four hundred and seventeen; the horse, two hundred and seventy-eight; the hog, one hundred and seven. The first animal refuses only one hundred and eighty-four of them; the second, ninety-two; the third, one hundred and twelve; the fourth, two hundred and seven;

* Genesis, chap. i. ver. 29, 30.

the fifth, one hundred and ninety. In these enumerations he comprehends only the plants which those animals eat with avidity, and those which they obstinately reject. The others are indifferent to them. They eat them when necessity requires, and even with pleasure, when they are tender. Not one of them goes to waste. Those which are rejected by some, are a high delice to others. The most acrid, and even the most venemous, serve to fatten one or another. The goat browses on the ranunculus of the meadow, though hot as pepper, on the tithymal and the hemlock. The hog devours the horse tail and henbane. He did not put the ass to this kind of proof, for that animal does not live in Sweden, nor the rein-deer, which supplies the want of him to so much advantage in northern regions, nor the other domestic animals, such as the duck, the goose, the hen, the pigeon, the cat, and the dog.

All these animals united, seem destined to convert to our advantage every thing that vegetates, by means of their universal appetites, and especially by that inexplicable instinct of domesticity which attaches them to Man; whereas no art can communicate it either to that timid animal the deer, nor even to some of the smaller birds, which seek to live under our protection, such as the swallow, who builds her nest in our houses. Nature has bestowed

bestowed this instinct of sociability with Man, only on those whose services might be useful to him at all seasons; and she has given them a configuration wonderfully adapted to the different aspects of the vegetable kingdom.

I say nothing of the camel of the Arabian, which can travel under a load, for several days together, without drinking, in traversing the burning sands of Zara; nor of the rein-deer of the Laplander, whose deeply-cleft hoof can fasten, and run along, on the surface of the snow; nor of the rhinoceros of the Siamese and of the Peguan, who, with the folds of his skin, which he can distend at pleasure, is able to disengage himself out of the marshy grounds of Siriam; nor of the Asiatic elephant, whose foot, divided into five ergots, is so sure on the steep mountains of the Torrid Zone; nor of the lama of Peru, who, with his forked feet, scrambles over the rocky heights of the Cordeliers. Every extraordinary situation is maintaining for Man a useful and commodious servant.

But without removing from our own hamlets, the single-hoofed horse pastures in the plains, the ponderous cow in the bottom of the valley, the bounding sheep on the declivity of the hill, the scrambling goat on the sides of the rocks; the hog, furnished with a proboscis, rakes up the morass from

from the bottom; the goofe and the duck feed on the fluviatic plants; the hen picks up every grain that was fcattered about, and in danger of being loft in the field; the four-winged bee collects a tribute from the fmall duft of the flowers; and the rapid pigeon haftens to fave from lofs the grains which the winds had conveyed to inacceffible rocks. All thefe animals, after having occupied through the day the various fites of vegetation, return in the evening to the habitation of Man, with bleatings, with murmurings, with cries of joy, bringing back to him the delicious produce of the vegetable creation, transformed, by a procefs altogether inconceivable, into honey, into milk, into butter, into eggs, and into cream.

I take delight in reprefenting to myfelf thofe early ages of the World, when men travelled over the face of the Earth, attended by their flocks and herds, laying the whole vegetable kingdom under contribution. The Sun, going before them, in the Spring, invited them to advance to the fartheft extremities of the North, and to return with Autumn bringing up his train. His annual courfe in the Heavens feems to be regulated by the progrefs of Man over the Earth. While the Orb of Day is advancing from the Tropic of Capricorn to that of Cancer, a traveller departing on foot from the Torrid Zone, may arrive on the fhores of the

Frozen

Frozen Ocean, and return thence into the Temperate Zone, when the Sun traces backward his progreſs, at the rate of only four, or, at moſt, five leagues a day, without being incommoded, the whole journey through, with either the ſultry heat of Summer, or the froſt of Winter. It is by regulating themſelves according to the annual courſe of the Sun, that certain Tartar-hordes ſtill travel.

What a ſpectacle muſt the virgin Earth have preſented to it's firſt inhabitants, while every thing was as yet in it's place, and Nature not yet degraded by the injudicious labours, or the deſperate madneſs of Man! I ſuppoſe them taking their departure from the banks of the Indus, that land which is the cradle of the Human Race, on a progreſs northward. They firſt croſſed the lofty mountains of Bember, continually covered with ſnow, which, like a rampart, encompaſs the happy land of Cachemire, and ſeparate it from the burning kingdom of Lahor *. They preſented themſelves to their eyes like vaſt amphitheatres of verdure, clothed, to the South, with all the vegetables of India, and, to the North, with all thoſe of Europe. They deſcended into the vaſt baſon which contains them, and there they beheld a part of the fruit-trees which were deſtined one day to enrich

* Conſult *Bernier*'s Deſcription of the Mogul Country.

our orchards. The apricots of Media, and the peach-trees of Perſia, ſkirted, with their bloſſoming boughs, the lakes, and the brooks of living water which bedew their roots. On leaving the ever-green vallies of Cachemire, they quickly penetrated into the foreſts of Europe, and went to repoſe under the foliage of the ſtately beech and tufted elm, which had as yet ſhaded only the loves of the feathered race, and which no Poet had hitherto ſung. They croſſed the boundleſs meadows which are waſhed by the Irtis, reſembling Oceans of verdure, here and there diverſified with long beds of yellow lilies, with ſtripes of ginzang, and tufts of broad-leaved rhubarb. Following the track of it's current, they plunged into the foreſts of the North, under the majeſtic branches of the fir, and the moving foliage of the birch.

What ſmiling vallies opened to their view, along the rivers-ſide, and invited them to deviate from the road, by promiſing them objects ſtill more lovely! What hills enamelled with unknown flowers, and crowned with ancient and venerable trees, endeavoured to perſuade them to proceed no farther! Arrived on the ſhores of the Icy Sea, a new order of things aroſe to view. There was now no more night. The Sun encompaſſed the Horizon round and round; and the miſts, diſperſed through the air, repeated, on different planes, the luſtre of his

rays

rays in rainbows of purple, and parhelions of dazzling radiance. But, if the magnificence of the Heavens was multiplied, desolation covered the face of the Earth. The Ocean was hoary with mountains of floating ice, which appeared in the Horizon like towers and cities in ruin; and on the land, nothing to be seen, in place of groves, but a wretched shrubbery blasted by the winds, and instead of verdant meads, rocks clothed with moss. The flocks which had accompanied them must there undoubtedly have prished; but even there Nature had still made provision for the necessities of Man. Those shores were composed of massy beds of coal *. The seas swarmed with fishes, and the lakes with fowls. They must find, among the animal tribes, servants and assistants: the rein-deer appeared in the middle of the mosses: she presented to those wandering families, the services of the horse in her agility, the fleece of the sheep in her fur; and shewing them, like the cow, her four teats, and but one nursling, she seemed to tell them that she was destined, like her, to share her milk with mothers oppressed by a too numerous offspring.

But the East must have been the part of the Globe which first attracted the attention of Mankind.

* Professor *Gmelin's* Journey to Siberia.

kind. That place of the Horizon where the Sun arifes, undoubtedly fixed their wondering eyes, at a period when no fyftem had interpofed to regulate opinion. On feeing that great Luminary arifing, from day to day, in the fame quarter of the Heavens, they muft have been perfuaded that he there had a fixed habitation, and that he had another where he fet, as a place of reft. Such imaginations, confirmed by the teftimony of their eyes, were, it muft be admitted, natural to men deftitute of experience, who had attempted to erect a tower which fhould reach to Heaven, and who, even in the illumination of more fcientific ages, believed, as a point of religion, that the Sun was drawn about in a chariot by horfes, and retired every evening to repofe in the arms of *Thetis*. I prefume, they would be determined to go in queft of him rather toward the Eaft than toward the Weft, under the perfuafion that they would greatly abridge their labour, by advancing to meet him.

It muft have been this conviction, I am difpofed to think, which left the Weft, for a long time, in a deferted ftate, under the very fame Latitudes which, in the Eaft, were fwarming with inhabitants, and which firft fent men in crowds toward the eaftern part of our Continent, where the earlieft and moft populous Empire of the World, that of China, was formed. What confirms me farther

farther in the belief, that the firſt men, who advanced toward the Eaſt, were engaged in this reſearch, and were in haſte to reach their object, is this, that having taken their departure from India, the cradle of the Human Race, like the founders of other Nations, they did not, like them, people the Earth progreſſively, as Perſia, Greece, Italy, and Gaul, were ſucceſſively, in a weſterly direction; but leaving deſert the vaſt and fertile countries of Siam, of Cochinchina, and of Tonquin, which are to this day half barbarous and uninhabited, they never gave up the purſuit till they were ſtopped by the Eaſtern Ocean; and they gave to the iſlands which they perceived at a diſtance, and on which they did not for a long time, acquire the ſkill to land, the name of *Gepuen*, which we have transformed into Japan, and which, in the Chineſe language, ſignifies, birth of the Sun.

Father *Kircher* * aſſures us, that when the firſt Jeſuit Aſtronomers arrived in China, and there reformed the Calendar, the Chineſe believed the Sun and the Moon to be no bigger than they appear to the eye; that, on ſetting, they retired to a deep cave, from which they iſſued next day at the time of riſing; and, finally, that the Earth was a plane and ſmooth ſurface. *Tacitus*, who has written Hiſ-

* See China illuſtrated, chap. ix.

tory

tory with ſuch profound judgment, does not deem it to be beneath him, in that of Germany, to relate the traditions of the weſtern Nations, who affirmed, that toward the North-weſt was the place where the Sun went to bed, and that they could hear the noiſe which he made on plunging into the waves.

It was from the quarter of the Eaſt, then, that the Orb of Day firſt attracted the curioſity of Mankind. There were, likewiſe, tribes which directed their courſe toward that point of the Globe, taking their departure from the ſouthern part of India. Theſe advanced along the peninſula of Malacca; and, familiarized with the Sea, which they coaſted moſt of the way, they were induced to form the reſolution of availing themſelves of the united accommodation which the two elements preſent to travellers, by navigating from iſland to iſland. They thus pervaded that vaſt belt of iſlands, which Nature has thrown into the Torrid Zone, like a bridge interſected by canals, in order to facilitate the communication of the two Worlds. When retarded by tempeſts, or contrary winds, they drew their barks aſhore, caſt a few ſeeds into the ground, reaped the crop, and deferred their re-embarkation till fairer weather, and a ſeaſon more favourable, encouraged them to venture forth.

Thus

Thus it was that the early mariners performed their voyages, and that the Phenicians, employed by *Necho*, King of Egypt, made the circuit of Africa in three years, departing by way of the Red-Sea, and returning by the Mediterranean, according to the account given of it by *Herodotus**.

The firſt Navigators, when they no longer ſaw iſlands in the Horizon, paid attention to the ſeeds which the Sea caſt upon the ſhore of thoſe where they were, and to the flight of the birds which were withdrawing from it. On the faith of theſe indications, they directed their courſe toward lands they had never yet ſeen. Thus were diſcovered the immenſe Archipelago of the Moluccas, the Iſlands of Guam, of Quiros, of the Society, and, undoubtedly, many others which are ſtill unknown to us. There was not one but what invited them to land, by preſenting ſome artractive accommodation. Some ſtretched out along the waves like Nereïds, poured from their urns, rills of freſh water into the Sea: it was thus that the Iſland of Juan Fernandez, with it's rocks and caſcades, preſented itſelf to Admiral *Anſon*, in the midſt of the South-Sea. Others, on the contrary, in the ſame Ocean, having their centres ſunk, and their extremities elevated, and crowned with cocoa-trees, of-

* Herodotus, book iv.

fer

fer to their canoes basons at all seasons tranquil, swarming with fishes and sea-fowls: such is that known by the name of *Woesterland*, or the Land of Water, discovered by the Dutch Navigator *Schouten*. Others, in the morning, appeared to them, in the bosom of the azure main, all over irradiated with the light of the Sun, as that one of the same Archipelago which goes by the name of *Aurora*. Some announce themselves in the darkness of night, by the flames of a volcano, as a pharos blazing aloft amidst the waters, or by the odoriferous emanations of their perfumes.

There was not one of them of which the woods, the hills, and the downs, did not maintain some animal, naturally familiar and gentle, but which becomes savage only from the cruel experience which it acquires of Man. They saw fluttering around them, as they disembarked on their strands, the silken-winged birds of paradise, the blue pigeons, the cacatoës all over white, the lauris all over red. Every new island tendered them some new present; crabs, fishes, shells, pearl-oysters, lobsters, turtles, ambergris; but the most agreeable, beyond all doubt, were the vegetables. Sumatra displayed, on her shores, the pepper plant; Banda, the nutmeg; Amboyna, the clove; Ceram, the palm-sagoe; Florès, the benzoin and sandal-wood; New-Guinea, groves of cocoa-trees; Taïti,

the

the bread-fruit. Every iſland aroſe in the midſt of the Sea, like a vaſe which ſupported a precious vegetable. When they diſcovered a tree laden with unknown fruit, they gathered ſome branches of it, and ran to meet their companions with ſhouts of joy, exhibiting to them this new benefit beſtowed by Nature.

From thoſe early voyages, and from thoſe ancient cuſtoms it is, that there has been diffuſed, over all Nations, the practice of conſulting the flight of birds before engaging in any enterprize, and that of going to meet ſtrangers, with the branch of a tree in the hand, in token of peace, and of joy at ſight of a preſent from Heaven. Theſe cuſtoms ſtill exiſt among the iſlanders of the South-Sea, and among the free tribes of America. But not fruit-trees alone fixed the attention of the firſt Men. If ſome heroic action, or ſome irreparable diſaſter, had excited admiration, or inſpired regret, the tree adjoining was ennobled by it. They preferred it, with thoſe fruits of virtue or of love, to ſuch as produced food or perfume. Thus, in the iſlands of Greece and of Italy, the laurel became the ſymbol of triumph, and the cypreſs that of eternal ſorrow. The oak ſupplied crowns of undecaying honour to the well-deſerving citizen, and ſimple graſſes decorated the brows of the men who had ſaved their Country. O Romans! people

worthy

worthy of the Empire of the World, in that you opened to every one of your ſubjects the career of virtuous exertion, and culled the moſt common plants of the field to ſerve as the badge of immortal glory, that a crown for the head of virtue might be found on every ſpot of the Globe.

From ſimilar attractions it was, that, from iſland to iſland, the Nations of Aſia made their way to the New World, where they landed on the ſhores of Peru. Thither they carried the name of children of that Sun whom they were purſuing. This brilliant chimera emboldened them to attempt the paſſage to America. It was not diſſipated till they reached the ſhores of the Atlantic Ocean: but it diffuſed itſelf over the whole Continent, where moſt of the Chiefs of the Nations ſtill aſſume the title of Children of the Sun *.

Mankind

* I do not mean to affirm, however, that America was peopled only from the iſlands of the South-Sea. I believe that a paſſage was opened into it, likewiſe, by the North of Aſia and of Europe. Nature always preſents to Mankind different means for the attainment of the ſame end. But the principal population of the New World came from the iſlands of the South-Sea. This I am able to prove by a multitude of monuments ſtill exiſting, and to the moſt remarkable of which I ſhall confine myſelf. It is demonſtrated, then, by the worſhip of the Sun, eſtabliſhed in India, in the iſlands of the South-Sea, and in Peru, as well as by the title of Suns, or Children of the Sun, aſſumed by many

Mankind, encompaſſed with ſo many bleſſings, continues to be wretched. There is not a ſingle genus of animal but what lives in abundance and liberty,

many families of thoſe countries; by the traditions of the Caraïbs ſcattered over the Antilles, and in Braſil, who give themſelves out as originally from Peru; by the very eſtabliſhment of that Monarchy of Peru, as well as that of Mexico, ſituated on the weſtern coaſt of America, which looks toward the iſlands of the South-Sea, and by the populouſneſs of their Nations, which were much more conſiderable, and more poliſhed than thoſe which inhabited the eaſtern coaſts, which ſuppoſes the former to be of a much higher antiquity; by the prodigious diffuſion of the Taïtian language, the different dialects of which are ſpread over moſt of the iſlands of the South-Sea, and of which words innumerable are to be found in the language of Peru, as has lately been proved by a gentleman of great learning, and even in that of the Malays in Aſia, ſome of which I myſelf was able to diſtinguiſh, particularly the word *maté* which ſignifies to kill; by the practices common and peculiar to the Nations of the Peninſula of Malacca, of the iſlands of Aſia, of thoſe of the South-Sea and of Braſil, which are not the inſpiration of Nature, ſuch as that of making fermented and intoxicating liquors, and of chewing herbs and roots; by the channels of the commerce of antiquity which flowed in this direction, ſuch as that of gold, which was very common in Arabia and in the Indies, in the time of the Romans, though there be very few mines of that metal in Aſia; but above all, by the trade of emeralds, which muſt have run in that track from remote antiquity, in order to reach the Old Continent, where no mine of that gem is to be found. Hear what is ſaid on this ſubject by *Tavernier*, who is worthy of credit when he ſpeaks of the commerce of Aſia, eſpecially as it relates to jewels. "It is an error of long ſtanding," ſays he, "which

liberty, the greateſt part without labour, all at peace with their ſpecies, all united to the objects of their choice, and enjoying the felicity of re-perpetuating

"many perſons have fallen into, to believe that the emerald was "found originally in the Eaſt. Moſt jewellers, on firſt looking "at a high-coloured emerald, are accuſtomed to ſay, this is an "Oriental emerald. But they are miſtaken, for I am well aſ-"ſured, that the Eaſt never produced one, either on the Conti-"nent, or in it's iſlands. I have made accurate enquiries into "this, in all the voyages I made." He had travelled ſix times by land through India. Hence it muſt be concluded, that the ſo highly valued emeralds of the ancients, came to them from America, through the iſlands of the South-Sea, through thoſe of Aſia, through India, the Red Sea, and, finally, through Egypt, from whence they had them.

To this may be objected the difficulty of navigating againſt the regular eaſterly winds, in order to paſs from Aſia to America, under the Torrid Zone; but, relatively to this ſubject, I ſhall repeat, that the regular winds do not blow there from the Eaſt, but from the North-eaſt and South-eaſt, and depend ſo much the more on the two Poles, the nearer you approach toward the Line. This oblique direction of the wind was ſufficient for perſons who navigated from iſland to iſland, and who had contrived barks the leaſt liable to deflection, ſuch as the double pros of the Iſles of Guam, the form of which ſeems to have been preſerved in the double balſes of the coaſt of Peru. *Schouten* found one of thoſe double pros ſailing more than ſix hundred leagues from the Iſland of Guam toward America. Beſides, it appears, likewiſe, that the South-Sea has it's monſoons, which have not hitherto been obſerved. Hear the remarks made, on the variation of thoſe winds, by an anonymous Engliſh Navigator, who ſailed round the World, with Sir *Joſeph Banks* and Mr. *Solander*, in the years

perpetuating themſelves by their families; whereas more than the half of Mankind is doomed to celibacy. The other half curſes the bands which have matched

years 1768, 1769, 1770, and 1771, page 83. "The inhabi-"tants of Otaheite, trade with thoſe of the adjacent iſlands which "lie to the eaſtward, and which we had diſcovered on our paſſage. "During three months of the year, the winds which blow from "the *Weſt quarter* are very favourable to them for carrying on "this traffic." Admiral *Anſon* likewiſe met with winds from the Weſt, in thoſe Latitudes, which retarded him.

Certain Philoſophers explain the correſpondencies to be found between the inhabitants of the iſlands and thoſe of Continents, by ſuppoſing iſlands to be lands once united to the Continent, but now ſwallowed up by the Ocean, the ſummit only, and a few of the inhabitants upon it, remaining above the water. But enough has been already ſaid in this Work, to evince that maritime iſlands are not fragments ſeparated from the Continent, and that they have mountains, peaks, lakes, hills, proportionable to their extent, and directed to the regular winds which blow over their ſeas. They have vegetables peculiar to themſelves, and which no where elſe attain the ſame degree of beauty. Farther, had thoſe iſlands formerly conſtituted part of our Continent, we ſhould find in them all thoſe of our quadrupeds which are to be met with in all climates; there were no rats nor mice in America, and in the Antilles, previous to the arrival of the Europeans, if we may believe the teſtimony of the Spaniſh Hiſtorian *Herrera*, and of Father *du Tertre*. We ſhould, likewiſe, have found in them the ox, the aſs, the camel, the horſe, but they contained none of theſe animals; but plenty of our common poultry, ducks, dogs, ſwine, as well as among the Iſlanders of the South-Sea, who themſelves had no other of our domeſtic animals.

 It

matched him. The greater part tremble at the thought of rearing a progeny, under the apprehension of being incapable to find subsistence for them. The greater part, in order to procure subsistence for themselves, are subjected to painful labours, and reduced to the condition of slaves to their fellow-creatures. Whole Nations are exposed to perish by famine: others, destitute of territory, are piled a-top of each other, while the greatest part of the Globe is a wilderness.

It is obvious that the first animals, such as the horse and the cow, being of a bulk and weight too considerable, could not possibly, be their utility ever so great, cross the seas in the small canoes of the early Navigators, who, on the other hand, would have been very careful not to transport with them such vermin as rats and mice.

Finally, let us revert to the general Laws of Nature. If all the islands of the South-Sea once formed a Continent, there must have been no sea, then, in the space which they occupy. Now, it is indubitably certain, that were you, at this day, to take away from around them, the Ocean by which they are encompassed, and the regular winds which blow over it, you would blast them with sterility. The islands of the South-Sea form, between Asia and America, a real bridge of communication, with a few arches alone of which we are acquainted, and of which it would not be difficult to discover the rest, from the other harmonies of the Globe. But here I restrain my conjectures on this subject. I have said enough to prove, that the same hand which has covered the Earth with plants and animals for the service of Man, has not neglected the different parts of his habitation.

There

There are many lands which never have been cultivated; but there is not one, known to Europeans, which has not been polluted with human blood. The very ſolitudes of the Ocean gulp down into their abyſſes, veſſels filled with men, ſunk to the bottom by the hands of men. In cities, to all appearance ſo flouriſhing by their arts and their monuments, pride and craft, ſuperſtition and impiety, violence and perfidy, are in a ſtate of inceſſant warfare, and keep the wretched inhabitants in perpetual alarm. The more that ſociety is poliſhed in them, the more numerous and cruel are the evils which oppreſs them. Is the induſtry of Man there exerted, only becauſe he is there moſt miſerable? Why ſhould the Empire of the Globe have been conferred on the ſingle animal which had not the government of it's own paſſions? How comes it that Man, feeble and tranſitory, ſhould be animated by paſſions at once ferocious and generous, deſpicable and immortal? How is it that, born without inſtinct, he ſhould have been able to acquire ſuch various knowledge? He has happily imitated all the arts of Nature, except that of being happy. All the traditions of the Human Race have preſerved the origin of theſe ſtrange contradictions; but Religion alone unfolds to us the cauſe of them. She informs us that Man is of a different order from

the reſt of animals; that his reaſon perverted has given offence to the Author of the Univerſe; that as a juſt puniſhment, he has been left to the direction of his own underſtanding; that he is capable of forming his reaſon only by the ſtudy of univerſal reaſon, diſplayed in the Works of Nature, and in the hopes which virtue inſpires; that by ſuch means alone he can be enabled to riſe above the animal, beneath the level of which he is ſunk, and to re-aſcend, ſtep by ſtep, along the ſteepy declivity of the celeſtial mountain from which he has been precipitated.

Happy is he, in theſe days, who, inſtead of rambling over the World, can live remote from Mankind! Happy the man who knows nothing beyond the circumference of his own Horizon, and to whom even the next village is an unknown land! He has not placed his affections on objects which he muſt never more behold, nor left his reputation at the mercy of the wicked. He believes that innocence reſides in hamlets, honour in palaces, and virtue in temples. His glory and his religion conſiſt in communicating happineſs to thoſe around him. If he beholds not in his garden the fruits of Aſia, or the ſhady groves of America, he cultivates the plants which delight his wife and children. He has no need of the monuments

of

of Architecture to dignify and embellish his landscape. A tree, under the shade of which a virtuous man is reclined to rest, suggests to him sublime recollections; the poplar in the forest recals to his mind the combats of *Hercules*; and the foliage of the oak reminds him of the crowning garlands of the Capitol.

STUDY TWELFTH.

OF SOME MORAL LAWS OF NATURE.

Weakneſs of Reaſon, of Feeling; Proofs of the Divinity and of the Immortality of the Soul from Feeling.

SUCH are the phyſical proofs of the exiſtence of the DEITY, as far as the feebleneſs of my reaſon has enabled me to produce and arrange them. I have collected, perhaps, ten times as many; but I perceived that I was, after all, but at the beginning of my career; that the farther I advanced, the farther it extended itſelf before me; that my own labour would ſoon overwhelm me; and that, conformably to the idea of Scripture, nothing would remain to me, after a complete ſurvey of the Works of Creation, but the moſt profound aſtoniſhment.

It

It is one of the great calamities of human life, that in proportion as we approach the ſource of truth, it flies away from before us; and that when, by chance, we are able to catch ſome of it's ſmaller ramifications, we are unable to remain conſtantly attached to them. Wherefore has the ſentiment which yeſterday exalted me to Heaven, at ſight of a new relation of Nature—wherefore has it diſappeared to-day? *Archimedes* did not remain always in an ecſtaſy, from the diſcovery of the relations of metals in the crown of King *Hiero*. He after that made other diſcoveries more congenial to his mind: ſuch as that of the cylinder circumſcribed within the ſphere, which he gave directions to have engraved on his tomb. *Pythagoras* contemplated, at length, with indifference, the ſquare of the hypothenuſe, for the diſcovery of which he had vowed, it is ſaid, a whole hecatomb of oxen to *Jupiter*. I recollect that when I firſt became maſter of the demonſtration of thoſe ſublime truths, I experienced a delight almoſt as lively as that of the great men who were the firſt inventors of them. Wherefore is it extinguiſhed? Why do I this day ſtand in need of novelties to procure me pleaſure? The mere animal is, in this reſpect, happier than we are: what pleaſed him yeſterday will likewiſe give him pleaſure to-morrow: he fixes for himſelf a boundary, which he

never

never exceeds; what is ſufficient for him, always appears to him beautiful and good. The ingenious bee conſtructs commodious cells, but never dreams of rearing triumphal arches, or obeliſks, to decorate her waxen city. A cottage was in like manner ſufficient for Man, in order to be as well lodged as a bee. What need had he of five orders of Architecture, of pyramids, of towers, of kioſques?

What, then, is that verſatile faculty, called *reaſon*, which I employ in obſerving Nature? It is, ſay the Schools, a perception of correſpondencies, which eſſentially diſtinguiſhes Man from the beaſt; Man enjoys reaſon, and the beaſt is governed merely by inſtinct. But if this inſtinct always points out to the animal what is beſt adapted to it, it is, therefore, likewiſe a reaſon, and a reaſon more precious than ours, in as much as it is invariable, and is acquired without the aid of long and painful experience. To this, the Philoſophers of the laſt age replied, that the proof of the want of reaſon in beaſts is this, that they act always in the ſame manner; thus they concluded, from the very perfection of their reaſon, that they had none. Hence we may ſee to what a degree great names, ſalaries, and aſſociations, may give currency to the greateſt abſurdities; for the argument of thoſe Philoſophers

Philoſophers is a direct attack on the Supreme Intelligence itſelf, which is invariable in it's plans, as animals are in their inſtinct. If bees uniformly conſtruct their cells of the ſame figure, it is becauſe Nature always makes bees of the ſame form.

I do not mean, however, to affirm, that the reaſon of beaſts and that of Man is the ſame : ours is, without diſpute, much more extenſive than the inſtinct of each animal in particular ; but if Man is endowed with an univerſal reaſon, muſt it not be becauſe his wants are univerſal ? He likewiſe diſcerns, it is true, the wants of other animals ; but may it not be relatively to himſelf that he has made this his ſtudy ? If the dog gives himſelf no concern about the oats of the horſe, it is, perhaps, becauſe the horſe is not ſubſervient to the wants of the dog.

We poſſeſs, notwithſtanding, natural adaptations peculiar to ourſelves, ſuch as the art of agriculture, and the uſe of fire. The knowledge of theſe, undoubtedly, would demonſtrate our natural ſuperiority, were it not, at the ſame time, a proof of our wretchedneſs. Animals are under no neceſſity to kindle fires, and to caſt ſeed into the ground, as they are clothed and fed by the hand of Nature ; beſides, many of them have, in themſelves, faculties

ties far ſuperior to our ſciences, which are, if the truth were told, foreign to us. If we have diſcovered ſome phoſphoric ſubſtances, the luminous fly of the Tropics has in itſelf a focus of light, which illuminates it during the night. While we are amuſing ourſelves in making experiments on electricity, the torpedo is employing it in ſelf-defence: and while the Academies and States of Europe are propoſing conſiderable prizes to the perſon who ſhall diſcover the means of determining the Longitude at Sea, the paillencu and the frigat are every day performing a flight of three or four hundred leagues between the Tropics, from Eaſt to Weſt, without ever failing to find, in the evening, the rock from which they took their departure in the morning.

Another mortifying inſufficiency preſents itſelf, when Philoſophy attempts to employ, in combatting the intelligence of Nature, that very reaſon which can be of no uſe but to diſcern it. What plauſible arguments, reſpecting the danger of the paſſions, the frivolity of human life, the loſs of fortune, of honour, of children! You can eaſily unhouſe me, divine *Marcus Aurelius*, and you too, ſceptical *Montagne*; but you have not provided for me another home. You put the ſtaff of Philoſophy into my hand, and ſay to me, walk on intrepidly; make the tour of the World, begging

your

your bread; you are juſt as happy as we in our villas, with our wives, and reſpected by all around. But here is an evil of which you had no foreſight. I have received, in my country, calumny only, as the reward of all my ſervices; I have experienced nothing but ingratitude on the part of my friends, and even of my patrons; I am ſolitary, and have no longer the means of ſubſiſtence; I am a prey to nervous diſorders; I ſtand in need of men, but my ſoul is troubled at the ſight of them, while I reflect on the fatal reaſons by which they are united, and that there is no poſſibility of intereſting them, but by flattering their paſſions, and by becoming vicious as they are. What good purpoſe does it ſerve to have ſtudied virtue? It ſhudders at ſuch recollections, and even without any reflection, merely at the ſight of men. The firſt thing that fails me is that very reaſon, on which you deſire me to lean for ſupport. All your fine logicks vaniſh, preciſely at the moment when I have moſt need of them. Put a reed into the hand of a ſick perſon: the very firſt thing that will drop from him, when attacked by a fit of illneſs, is that ſame reed; and if he ventures to reſt his whole weight upon it, moſt probably it will break, and, perhaps run through his hand. Death, you tell me, will cure every thing; but in order to die, I have no occaſion for all this reaſoning; beſides, I do not drop, with the vigor of life, into the arms of death,

death, but dying and reafoning no longer, ftill, however, feeling and fuffering *.

* Thus, Religion has greatly the fuperiority over Philofophy, in as much as it fupports us, not by our reafon, but by our refignation. She would have us, not on foot, and ftirring about, but ftretched on a bed of languifhing: not on the theatre of the World, but repofing at the footftool of the Throne of God; not tormented with folicitude about futurity, but confident and compofed. When books, honours, fortune, and friends forfake us, fhe prefents us, as a pillow for our head, not the recollection of our frivolous and theatrical virtues, but that of our infufficiency; and, inftead of the arrogant maxims of Philofophy, fhe demands of us only calmnefs, peace, and filial confidence.

I muft make one reflection more refpecting this reafon, or, which amounts to the fame thing, refpecting this ingenuity of which we are fo vain: namely this, that it appears to be the refult of our miferies. It is very remarkable, that the Nations which have been moft celebrated for their wit, their arts, and their induftry, were the moft miferable on the face of the Earth, from their government, their paffions, or their difcords. Read the hiftory of the lives of moft men who have been diftinguifhed by the fuperiority of their intellectual powers, and you will find that they were extremely miferable, efpecially in their childhood. One-eyed perfons, the lame, the hump-backed have, in general, more wit than other men, becaufe, from being more difagreeably conformed, they apply their reafoning powers toward obferving with more attention the relations of Society, in the view of fkreening themfelves againft it's oppreffion. Their humour, it is true, is commonly of the farcaftic kind, but this character is fufficiently applicable to what paffes in the World for wit. Befides, it was not Nature which rendered them malignant, but the raillery, or the contempt, of thofe with whom they have lived.

What

What is, once more, that reaſon, of which we boaſt ſo triumphantly? As it is nothing more than the relation of objects to our wants, it is reduced, then, to mere perſonal intereſt. Hence it is that we have ſo many family reaſons, reaſons of aſſociations, reaſons of ſtate; reaſons of all countries, and of all ages: hence it is, that the reaſon of a young man is one thing, and that of an old man another; that the reaſon of a woman differs from that of a hermit, and a ſoldier's from a prieſt's. Every body, ſays the Duke *de la Rochefoucault*, has reaſon (is in the right). Yes, undoubtedly, and it is becauſe every one has reaſon, that no one agrees with another.

This ſublime faculty farther undergoes, from the firſt moments of it's expanſion, a ſhock ſo violent, that it is rendered, in ſome ſort, incapable of penetrating into the field of Nature. I do not ſpeak of our methods and ſyſtems, which diffuſe falſe lights over the firſt principles of human knowledge, by ſhewing us truth only in books, involved in machinery, and diſplayed on theatres. I have ſaid ſomething of thoſe obſtacles, in the objections which I have ventured to propoſe againſt the elements of our Sciences; but the maxims inſtilled into us from our earlieſt infancy, *make a fortune*, *be the firſt*, are alone ſufficient to ſubvert

our

our natural reaſon ; they exhibit to us the juſt and the unjuſt, only as they ſtand related to our perſonal intereſts, and to our ambition ; they uſually attach us to the fortune of ſome powerful and reputable corps, and render us, as it may happen, atheiſts or devotees, debauched or continent, Carteſians or Newtonians, juſt as it affects the cauſe which has become our only moving principle.

Good cauſe, then, we have to miſtruſt reaſon, as, from the very firſt ſtep, it miſleads us in our reſearches after truth and happineſs. Let us enquire, whether there is not in Man ſome faculty more noble, more invariable, and of greater extent. Though, in proſecuting this enquiry, I have to preſent only views vague and indeterminate, I hope that men more enlightened than I can pretend to be, may one day fix them, and carry them much farther. In this confidence, with the feeble powers which I poſſeſs, I am going to engage in a career, well worthy of the Reader's moſt ſerious attention.

Deſcartes lays this down as the baſis of the firſt natural truths : *I think, therefore I exiſt.* As this Philoſopher has acquired a very high degree of reputation, which he merited, beſides, by his knowledge in Geometry, and, above all, by his virtues, his argument in proof of exiſtence has been greatly

 extolled,

extolled, and dignified with the title of axiom. But, if I am not miſtaken, this argument labours under an eſſential defect, in that it has not the generality of a fundamental principle; for it implicitly follows, that when a man does not think, he ceaſes to exiſt, or, at leaſt, to have a proof of his exiſtence. It follows farther, that the animal creation, to which *Deſcartes* denied the power of thought, had no proof that they exiſted; and that the greateſt part of beings are in a ſtate of non-exiſtence with reſpect to us, in as much as they excite in us ſimple ſenſations merely, of forms, of colours, and of movements, without any reference to thought. Beſides, the reſults of human thought having been frequently employed, from their verſatility, to ſuggeſt doubts reſpecting the exiſtence of God, and even of our own, as was the caſe with the ſceptic *Pyrrho*; this reaſoning, like all the operations of the human underſtanding, falls under well-grounded ſuſpicion.

I ſubſtitute, therefore, in place of the argument of *Deſcartes*, that which follows, as it appears to me both more ſimple and more general: *I feel, therefore I exiſt.* It extends to all our phyſical ſenſations, which admoniſh us much more frequently of our exiſtence than thought does. It has for it's moving principle an unknown faculty of the ſoul, which I call *ſentiment*, or mental feeling, to which

thought

thought itſelf muſt refer; for the evidence to which we attempt to ſubject all the operations of our reaſon, is itſelf ſimply ſentiment.

I ſhall, firſt, make it appear, that this myſterious faculty differs eſſentially from phyſical ſenſations, and from the relations preſented to us by reaſon; and that it blends itſelf in a manner conſtant and invariable in every thing that we do; ſo that it is, if I may be allowed the expreſſion, human inſtinct.

As to the difference of ſentiment from phyſical ſenſation, it is evident, that *Iphigenia* at the altar gives us an impreſſion of a very different nature from that produced by the taſte of a fruit, or by the perfume of a flower; and as to that which diſtinguiſhes it from a proceſs of the underſtanding, it is certain that the tears and the deſpair of *Clytemneſtra* excite in us emotions of a very different kind from thoſe ſuggeſted by a ſatyr, a comedy, or even, if you will, by a mathematical demonſtration.

Not but that reaſon may ſometimes iſſue in ſentiment, when it preſents itſelf with evidence; but the one is only, with relation to the other, what the eye is with relation to the body, that is, an intellectual viſion: beſides, mental feeling appears to me

to be the refult of Laws of Nature, as reafon is the refult of political Laws.

I fhall give no farther definition of this obfcure principle, but I fhall render it fufficiently intelligible, if I am fo happy as to make it felt. And here I flatter myfelf with fuccefs, by firft ftating an oppofition between it and reafon. It is very remarkable that women, who are always nearer to Nature, from their very irregularities, than men with their pretended wifdom, never confound thefe two faculties, and diftinguifh the firft by the name of fenfibility, or fentiment, by way of excellence, becaufe it is, in truth, the fource of our moft delicious affections. They are continually on their guard againft confounding, as moft men do, the underftanding and the heart, reafon and fentiment. The one, as we have feen, is frequently our work; the other is always the work of Nature. They differ fo effentially from each other, that if you wifh to annihilate the intereft of a Work which abounds in fentiment, you have only to introduce an infufion of reafoning.

This is a fault which the moft celebrated Writers have committed, in all the ages in which Society completes it's feparation from Nature. Reafon produces many men of intelligence in ages pretendedly

pretendedly polifhed; and fentiment, men of genius, in ages pretendedly barbarous. Reafon varies from age to age, and fentiment is always the fame. The errors of reafon are local and changeable, but the truths of fentiment are invariable and univerfal. Reafon makes the I Greek, the I Englifhman, the I Turk; and fentiment, the I Man, and the I Divine. We ftand in need, at this day, of commentaries, in order to underftand the books of antiquity, which are the works of reafon, fuch as thofe of moft Hiftorians, and Poets, fatyrical and comic, as *Martial*, *Plautus*, *Juvenal*, and even thofe of the paft age, as *Boileau* and *Moliere*; but none will ever be neceffary, in order to be moved by the fupplications of *Priam* at the feet of *Achilles*, by the defpair of *Dido*, by the tragedies of *Racine*, and the lively fables of *La Fontaine*. We frequently ftand in need of many combinations, for the purpofe of bringing to light fome concealed reafon of Nature; but the fimple and pure fentiments of repofe, of peace, of gentle melancholy, which fhe infpires, come to us without effort.

Reafon, I grant, procures for us pleafures of a certain kind; but if fhe difcovers to us fome fmall portion of the order of the Univerfe, fhe exhibits to us, at the fame time, our own deftruction, attached to the Laws of it's prefervation; fhe pre-

 fents

ſents to us, at once, the evils which are paſt, and thoſe which are to come; ſhe furniſhes arms to our paſſions, at the very time when ſhe is demonſtrating to us their inſufficiency. The farther that ſhe carries us, the more are the proofs which ſhe accumulates, when we come back to ourſelves, of our own nothingneſs; and, ſo far from ſoothing our pains by her reſearches, ſhe frequently aggravates them bitterly by the diſcoveries which ſhe makes. Sentiment, on the contrary, blind in it's deſires, embraces the monuments of all countries, and of all ages; it is ſoothed to a delicious complacency, in the midſt of ruins, of combats, and of death itſelf, in contemplating an undeſcribable eternal exiſtence; it purſues, in all it's appetites, the attributes of Deity, infinity, extenſion, duration, power, grandeur, and glory; it mingles the ardent deſires of theſe with all our paſſions; it thus communicates to them a certain ſublime impulſe; and, by ſubduing our reaſon, itſelf becomes the moſt noble, and the moſt delicious inſtinct of human life.

Sentiment demonſtrates to us, much better than reaſon, the ſpirituality of the ſoul; for reaſon frequently propoſes to us, as an end, the gratification of our groſſeſt paſſions*, whereas ſentiment is ever

* Liſten to the voice of reaſon, is the inceſſant admonition of our moral Philoſophers. But do they not perceive that they are putting

pure in it's propenſities. Beſides, a great many natural effects which eſcape the one, are under the control of the other; ſuch is, as has been obſerved, evidence itſelf, which is merely a matter of feeling, and over which reflection exerciſes no conſtraint; ſuch, too, is our own exiſtence. The proof of it is not in the province of reaſon; for, why is it that I exiſt? where is the reaſon of it? But I feel that I exiſt, and this ſentiment is ſufficient to produce conviction.

This being laid down, I proceed to demonſtrate, that there are two powers * in Man, the one animal,

putting us into the hand of our greateſt enemy? Has not every paſſion a reaſon at command?

* It is from want of attention to thoſe two powers, that ſo many celebrated performances, on the ſubject of Man, preſent a falſe colouring. Their Authors ſometimes repreſent him to us as a metaphyſical object. You would be tempted to think that the phyſical wants, which ſtagger even the Saints, are only feeble acceſſories of human life. They compoſe it merely of monads, of abſtractions, and of moralities. Others diſcern nothing in man but an animal, and diſtinguiſh in him only the coarſeſt groſſneſs of ſenſe. They never ſtudy him without the diſſecting knife in their hand, and when he is dead, that is to ſay, when he is man no longer. Others know him only as a political individual: they perceive him only through the medium of the correſpondencies of ambition. It is not Man that intereſts them; it is a Frenchman, an Engliſhman, a Prelate, a Gentleman. *Homer* is the only Writer, with whom I am acquainted, who has painted

mal, and the other intellectual, both of an opposite nature, and which, by their union, constitute human life; just as the harmony of every thing on the Earth is composed of two contraries.

Certain

painted Man complete: all others, the best not excepted, present nothing but a skeleton of him. The Iliad of *Homer*, if I may be allowed to judge, is the painting of every Man, as it is that of all Nature. All the passions are there, with their contrasts and their shades, the most intellectually refined, and the most sensually gross. *Achilles* sings the praises of the Gods to the sound of his lyre, and tends the cookery of a leg of mutton in a kettle. This last trait has given grievous offence to our theatrical writers, who deal in the composition of artificial heroes, namely, such as disguise and conceal their first wants, as their authors themselves disguise their own to Society. All the passions of the human breast are to be found in the Iliad: furious wrath in *Achilles*, haughty ambition in *Agamemnon*, patriotic valour in *Hector*; in *Nestor*, unimpassioned wisdom; in *Ulysses*, crafty prudence; calumny in *Thersites*; voluptuousness in *Paris*; faithless love in *Helen*; conjugal love in *Andromache*; paternal affection in *Priam*; friendship in *Patroclus*; and so on: and besides all this, a multitude of intermediate shades of all these passions, such as the inconsiderate courage of *Diomedes*, and that of *Ajax*, who dared to challenge the Gods themselves to the combat: then the oppositions of situation and of fortune which detach those characters; such as a wedding, and a country festival, depicted on the formidable buckler of *Achilles*; the remorse of *Helen*, and the restless solicitude of *Andromache*; the flight of *Hector*, on the point of perishing under the walls of his native city, in the sight of his people, whose only defender he was; and the peaceful objects presented to him at that tremendous moment, such as the grove of trees, and the fountain to which the Trojan

young

Certain Philoſophers have taken pleaſure in painting Man as a God. His attitude, they tell us, is that of command. But, in order to his having

young women were accuſtomed to reſort, to waſh their robes, and where they loved to aſſemble in happier days.

This divine Genius, having appropriated to his heroes a leading paſſion of the human heart, and having put it in action in the moſt remarkable phaſes of human life, has allotted, in like manner, the attributes of God to a variety of Divinities, and has aſſigned to them the different kingdoms of Nature; to *Neptune*, the Ocean: to *Pluto*, the infernal regions; to *Juno*, the air; to *Vulcan*, the fire; to *Diana*, the foreſts; to *Pan*, the flocks; in a word, the Nymphs, the Naïads, nay, the very Hours, have all a certain department on the Earth. There is not a ſingle flower but what is committed to the ſuperintendance of ſome Deity. It is thus that he has contrived to render the habitation of Man celeſtial. His Work is the moſt ſublime of Encyclopedias. All the characters of it are ſo exactly in the human heart, and in Nature, that the names by which he has deſigned them have become immortal. Add to the majeſty of his plans a truth of expreſſion, which is not to be aſcribed alone to the beauty of his language, as certain Grammarians pretend, but to the vaſt extent of his obſervation of Nature. It is thus, for example, that he calls the Sea *impurpled*, at the moment that the Sun is ſetting; becauſe that then the reflexes of the Sun in the Horizon render it of that colour, as I myſelf have frequently remarked. *Virgil*, who has imitated him cloſely, abounds in theſe beauties of obſervation, to which Commentators pay very little, if any, attention. In the ~~Georgics,~~ for inſtance, *Virgil* gives to the Spring the epithet of *bluſhing*; *vere rubenti*, ſays he. As his Tranſlators and Commentators have taken no pains to convey this, any more than a multitude of ſimilar touches, I was long impreſſed

having the air of command, it is neceſſary that other men ſhould have that of ſubmiſſion, without which he would find an enemy in every one of his equals. The natural empire of Man extends only to animals; and in the wars which he wages with them, or in the care which he exerciſes over them, he is frequently conſtrained to drop his attitude of emperor, and to aſſume that of a ſlave.

Others repreſent Man as the perpetual object of vengeance to angry Heaven, and have accumulated on his exiſtence, all the miſeries which can render it odious to him. This is not painting Man. He is not formed of a ſimple nature, like other animals, each ſpecies of which invariably preſerves it's proper character; but of two oppoſite natures, each of which is itſelf farther ſubdivided into ſeveral paſſions, which form a contraſt. In virtue of one of theſe natures, he unites in himſelf all the wants, and all the paſſions of animals; and in virtue of the other, the ineffable ſentiments of the Deity. It is to this laſt inſtinct, much

impreſſed with the belief that this epithet was introduced merely to fill up the meaſure of the verſe: but having remarked that, early in Spring, the ſhoots and buds of moſt trees aſſumed a ruddy appearance, previouſly to throwing out their leaves, I thence was enabled to comprehend what was the preciſe moment of the ſeaſon which the Poet intended to deſcribe by *vere rubenti*.

more

more than to his reflective powers, that he is indebted for the conviction which he has of the existence of God; for I suppose, that having, by means of his reason, the faculty of perceiving the correspondencies which exist between the objects of Nature, he found out the relations which subsist between an island and a tree, a tree and a fruit, a fruit and his own wants; he would readily feel himself determined, on seeing an island, to look for food upon it: but his reason, in shewing him the links of four natural harmonies, would not refer the cause of them to an invisible Author, unless he had the sentiment of it deeply impressed on his heart. It would stop short at the point where his perceptions stopped, and where those of animals terminate. A wolf which should swim over a river, in order to reach an island on which he perceived grass growing, in the hope of there finding sheep likewise, has an equal conception of the links which connect the four natural relations of the island, the grass, the sheep, and his own appetite: but he falls not down prostrate before the intelligent Being who has established them.

Considering Man as an animal, I know of no one to be compared with him in respect of wretchedness. First of all, he is naked, exposed to insects, to the wind, to the rain, to the heat, to the cold, and laid under the necessity, in all countries,

of finding himſelf clothing. If his ſkin acquires, in time, ſufficient hardneſs to reſiſt the attacks of the elements, it is not till after cruel experiments, which ſometimes flay him from top to toe. He knows nothing naturally, as other animals do. If he wants to croſs a river, he muſt firſt learn to ſwim; nay, he muſt, in his infancy, be taught to walk and to ſpeak*. There is no country ſo happily ſituated, in which he is not obliged to prepare his food with conſiderable care and trouble. The banana and the bread-fruit tree give him between the Tropics, proviſions all the year round; but then he muſt plant thoſe trees, he muſt encloſe them within thorny fences, to preſerve them from the beaſts; he muſt dry part of the fruits, for a ſupply during the hurricane ſeaſon; and muſt build repoſitories in which to lay them up. Beſides, thoſe uſeful vegetables are reſerved for certain privileged iſlands alone; for over the reſt of the Earth, the culture of alimentary grains and roots requires a great multitude of arts and preparations. Suppoſe him to have collected around him every bleſſing his heart can deſire, the love and the pleaſure which flow from abundance, avarice, thieves, the incurſions of the enemy, diſturb his enjoyment. He muſt have Laws, Judges,

* The very name of infant is derived from the Latin word *infans*, that is to ſay, one who cannot ſpeak.

magazines,

magazines, fortreſſes, confederacies, and regiments, to protect from without, and from within, his ill-fated corn-field. Finally, when it is in his power to enjoy with all the tranquility of a ſage, languor takes poſſeſſion of his mind; he muſt have comedies, balls, maſquerades, amuſements to prevent him from reaſoning with himſelf.

It is impoſſible to conceive how a Nation could exiſt with the animal paſſions ſimply. The ſentiments of natural juſtice, which are the baſis of legiſlation, are not the reſults of our mutual wants, as has been by ſome pretended. Our paſſions are not retrogreſſive; they have ourſelves alone for their centre. A family of ſavages, living in the midſt of plenty, would be no more concerned about the miſery of their neighbours periſhing for want, than we concern ourſelves at Paris, that our ſugar and coffee are coſting Africa rivers of tears.

Reaſon itſelf, united to the paſſions, would only ſtimulate their ferocity; for it would ſupply them with new arguments, long after their deſires were gratified. It is, in moſt men, nothing more than the relation between beings and their wants, that is, their perſonal intereſt. Let us examine the effect of it, combined with love and ambition, the two tyrants of human life.

Let us firſt ſuppoſe a ſtate entirely governed by Love, ſuch as that on the banks of the Lignon, imagined by the ingenious *d'Urfeius.* I beg leave to aſk, Who would be at the trouble of building houſes there, and of labouring the ground? Muſt we not ſuppoſe, that ſuch a country would contain ſervants, whoſe induſtry ſhould compenſate the idleneſs of their maſters? Will not theſe ſervants be reduced to the neceſſity of abſtaining from making love, in order that their maſters may be inceſſantly employed in it? Beſides, In what manner are the old people of both ſexes to paſs their time? A fine ſpectacle for them truly, to behold their children always indulging in the dalliance of the tender paſſion! Would not ſuch a ſpectacle become to them a perpetual ſource of regret, of ill-humour, of jealouſy, as it is among thoſe of our own country? Such a government, in truth, were it even in the iſlands of the South-Sea, under the groves of the cocoa and bread-fruit trees, where there was nothing to do but to eat and make love, would ſoon be torn with diſcord, and oppreſſed with languor.

But, on the ſuppoſition that the principle of *ſocial reaſon* were to oblige every family to labour each for it's own ſupport, and to introduce more variety into their way of living, by inviting to it our arts and ſciences; it would quickly accelerate their

their deſtruction. We muſt by no means depend on ever hearing there any of thoſe affecting dialogues which *d'Urfeius* puts into the mouth of *Aſtræa* and *Celadon*; they are dictated neither by animal love, nor by enlightened reaſon. Both of theſe employ a very different logic. When a lover, illuminated there with the ſcience which he had borrowed of us, wiſhed to inſpire his miſtreſs with a mutual paſſion, if, however, it were needful to employ diſcourſe in order to accompliſh this, he would talk to her of ſprings, of maſſes, of attractions, of fermentations, of the electric ſpark, and of the other phyſical cauſes which determine, according to our modern ſyſtems, the propenſities of the two ſexes, and the movements of the paſſions. *Political reaſons* would interpoſe, and affix the ſeal to their union, by ſtipulating, in the melancholy and mercenary language of our contracts, for dowries, maintenances, redemptions, pin-monies, poſt-obits. But the *perſonal reaſon* of each contracting party would quickly ſeparate them. As ſoon as a man ſaw his wife overtaken with diſeaſe, he would ſay to her: "My temperament calls for a wife "who enjoys health, and conſtrains me to abandon "you." She would anſwer him, undoubtedly, in order to preſerve conſiſtency: "You do well "to obey the dictates of Nature. I ſhould, in "like manner, have looked out for another huſ-"band, had you been in my place." A ſon would

ſay

ſay to his aged and declining father: "You begot "me for your pleaſure, it is time that I ſhould live "for mine." Where ſhould we find citizens diſpoſed to unite for maintaining the laws of ſuch a Society; the ſoldiers diſpoſed to meet death in defence of it, and the magiſtrate who would undertake to govern it? I ſay nothing of an infinite number of other diſorders, which follow in the train of that blind and headſtrong paſſion, even when directed by cool and diſpaſſionate reaſon.

If, on the other hand, a Nation were under the dominion of ambition ſolely, it would come ſtill ſooner to deſtruction; either from external enemies, or by means of it's own citizens. It is, firſt, difficult to imagine how it could be reduced to form, under the authority of one Legiſlator, for, how can we conceive the poſſibility of ambitious men voluntarily ſubmitting to another man? Thoſe who have united them, as *Romulus*, *Mahomet*, and all founders of Nations, have commanded attention and obedience only by ſpeaking in the name of the DEITY. But ſuppoſing this union, by whatever means, accompliſhed, could ſuch an aſſociation ever be happy? Let Hiſtorians extol conquering Rome ever ſo highly, Is it credible that her citizens then deſerved the appellation of fortunate? While they were ſpreading terror over the Globe, and cauſing floods of tears to flow,

were

were there at Rome no hearts oppreſſed with terror, and no eye overflowing, for the loſs of a ſon, of a father, of a huſband, of a lover? Were the ſlaves, who conſtituted by far the greateſt part of her inhabitants, were they happy? Was the General of the Roman army himſelf happy, crowned with laurels as he was, and mounted on a triumphal car, around which, in conformity to a military Law, his own ſoldiers were ſinging ſongs, in which his faults were expoſed, to prevent his waxing proud, and forgetting himſelf? And when Providence permitted *Paulus Emilius* to triumph over a King of the Macedonians, and his poor children, who ſtretched out their little hands to the Roman People, to excite compaſſion, it was ſo ordered, that the conqueror ſhould, at that very ſeaſon, ſuffer the loſs of his own children, that no one man might be allowed to triumph with impunity over the tears of Mankind.

This very People, however, ſo diſpoſed to purſue their own glory, through the calamities of others, were obliged, in order to diſſemble the horror of it, to veil the tears of the Nations with the intereſt of the Gods, as we diſguiſe with fire the fleſh of the animals which is to ſerve us for food. Rome, following the order of deſtiny, was to become, at length, the capital of the World. She armed her ambition with a *celeſtial reaſon*, in order

to render her victorious over powers the most formidable, and to curb by means of it the ferocity of her own citizens, by inuring them to the practice of sublime virtue. What would they have become, had they given themselves up, without restraint to that furious instinct? They would have resembled the savages of America, who burn their enemies alive, and devour their flesh still streaming with blood. This Rome at last experienced, when her Religion presented no longer any thing to her enlightened inhabitants, except unmeaning imagery. Then were seen the two passions natural to the heart of Man, ambition and love, inviting to a residence within her walls, the luxury of Asia, the corruptive arts of Greece, proscriptions, murders, poisonings, conflagrations, and giving her up a prey to barbarous Nations. The Theutatès of the Gauls then issuing from the forests of the North, and arriving at the Capitol, made the Roman *Jupiter* to tremble in his turn.

Our *reasons of state* are, in modern times, less sublime, but are not for that less fatal to the repose of Mankind, of which a judgment may be formed by the wars of Europe, which are continually disturbing that of the Globe. A Nation delivered up to it's passions, and to simple *reasons of state*, would speedily accumulate upon itself all the miseries incident to humanity; but Providence has

implanted

implanted in the breaſt of Man a ſentiment which ſerves as a counterbalance to the weight of these, by directing his deſires far beyond the objects of this World; the ſentiment I mean is that of the exiſtence of the DEITY. Man is not Man, becauſe he is a reaſoning animal, but becauſe he is a religious animal.

It is remarked by *Cicero* and *Plutarch*, that there was not a ſingle People known up to their time, among whom there were no traces of religion to be found. The ſentiment of DEITY is natural to Man. It is that illumination which St. *John* denominates *the true Light, which lighteth every Man that cometh into the World*. I find great fault with certain modern Authors, and even ſome of them Miſſionaries, for having aſſerted, that certain Nations were deſtitute of all ſenſe of DEITY. This is, in my apprehenſion, the blackeſt of calumnies with which a Nation can be branded, becauſe it, of courſe, entirely ſtrips them of the exiſtence of every virtue; and if ſuch a Nation betrays any appearance of virtue, it can be only under the impulſe of the moſt abominable of vices, which is hypocriſy: for there can be no virtue diſtinct from Religion. But there is not a ſingle one of thoſe inconſiderate Writers, who does not, at the ſame time, himſelf furniſh the means of refuting his own imputation; for ſome of them acknowledge,

 that

that these very atheiftical Nations, on certain days, prefent homage to the Moon; or that they retire into the woods, to perform certain ceremonies, the knowledge of which they carefully conceal from ftrangers.

Father *Gobien*, among others, in his Hiftory of the Mariannes Iflands, after having affirmed, that their inhabitants had no knowledge of any Deity, and difcovered not the flighteft idea of Religion, tells us immediately after, that they practife invocation of the dead, to whom they give the appellation of *anitis*, whofe fkulls they preferve in their houfes, and to which they afcribe the power of controlling the elements, of changing the feafons, and of reftoring health: that they are perfuaded of the immortality of the foul, and acknowledge a Paradife and a Hell. Such opinions clearly demonftrate that they have ideas of DEITY.

All Nations have the fentiment of the exiftence of GOD; not that they all raife themfelves to Him, after the manner of a *Newton* and a *Socrates*, in contemplation of the general harmony of his Works, but by dwelling on thofe of his benefits which intereft them the moft. The Indian of Peru worfhips the Sun; he of Bengal, the Ganges, which fertilizes his plains; the black Iolof, the Ocean, which cools his fhores: the Samoïède of the

the North, the rein-deer which feeds him. The wandering Iroquois demands of the Spirits, which preside over the lakes and the forests, plentiful fishing and hunting seasons. Many Nations worship their Kings. There is not one of them which, in order to render more dear to men those august dispensers of their felicity, have not called in the intervention of some Divinity for the purpose of consecrating their origin. Such are, in general, the Gods of the Nations: but when the passions interpose, and darken among them this divine instinct, and blend with it either the madness of ambition, or the seduction of voluptuousness, you behold them prostrating themselves before serpents, crocodiles, and other gods, too abominable to be mentioned. You behold them offering in sacrifice, the blood of their enemies and the virginity of their daughters. Such as is the character of a People, such is it's religion. Man is carried along by this celestial impulse so irresistibly, that, when he ceases to take the DEITY for his model, he never fails to make one after his own image.

There are, therefore, two powers in Man, the one animal, the other divine. The first is incessantly giving him the sentiment of his wretchedness; the second, constantly awakening in him that of his own excellence: and from their con-

flicts are produced the varieties and the contradictions of human life.

By means of the ſentiment of our wretchedneſs it is, that we become alive to every thing which preſents to us the idea of aſylum and protection, of eaſe and accommodation. Hence it is that moſt men cheriſh the thought of calm retreats, of abundance, and of all the bleſſings which bountiful Nature has provided, on the Earth, to ſupply our wants. It is this ſentiment which gave to Love the chains of *Hymen*, in order that man might one day find the companion of his pains in that of his pleaſures; and that children might be enſured of the aſſiſtance of their parents. It is this which renders the warm and eaſy tradeſman ſo eager after relations of court-intrigues, of battles, and deſcriptions of tempeſts, becauſe dangers external and diſtant increaſe internal happineſs and ſecurity. This ſentiment frequently mingles with the moral affections: it looks for ſupport in friendſhip, and for encouragement in commendation. It is this which renders us attentive to the promiſes of the ambitious man, when we are eager to follow him, like ſlaves, ſeduced by the ideas of protection with which he amuſes us. Thus the ſentiment of our wretchedneſs is one of the moſt powerful bonds of political ſociety, though it attaches us to the Earth.

The

The ſentiment of Deity impels us in a contrary direction *. It was this which conducted Love to the altar, and dictated to the lips of the Lover the firſt vows of fidelity; it devoted the firſt children to Heaven, while as yet there was no ſuch thing as political Law; it rendered Love ſublime, and Friendſhip generous; with one hand it ſuccoured the miſerable, and oppoſed the other to tyrants; it became the moving principle of generoſity, and of every virtue. Satisfied with the conſciouſneſs of having deſerved well of Mankind, it nobly diſdained the recompence of applauſe. When it ſhewed itſelf in arts and ſciences, it became the ineffable charm which tranſported us in contemplating them: the moment it withdrew from them, languor ſucceeded. It is this ſentiment which

* Whenever any one has loſt this firſt of harmonies, all the others follow it. Does it not well deſerve to be remarked, that all the Writings of Atheiſts are inſufferably dry and unintereſting? They ſometimes fill you with aſtoniſhment, but never do they touch the heart. They exhibit caricatures only, or gigantic ideas. They are totally deſtitute of order, of proportion, of ſenſibility. I do not exempt from this cenſure any one, except the poem of *Lucretius*. But this very exception, as has been ſaid before, only confirms the truth of my obſervation; for when this Poet wiſhed to pleaſe, he found himſelf under the neceſſity of introducing Deity, as is evident from his exordium, which commences with that beautiful apoſtrophe; *Alma Venus, &c.* Every where elſe, when he ſets about a diſplay of the Philoſophy of *Epicurus*, his inſipidity becomes abſolutely inſupportable.

confers immortality on the men of genius who diſcover to us, in Nature, new relations of intelligence.

When theſe two ſentiments happen to croſs each other, that is, when we attach the divine inſtinct to periſhable objects, and the animal inſtinct to things divine, our life becomes agitated by contradictory paſſions. This is the cauſe of thoſe innumerable frivolous hopes and fears with which men are tormented. My fortune is made, ſays one, I have enough to laſt me *for ever*; and to-morrow he drops into the grave. How wretched am I! ſays another, I am undone *for ever*; and death is at the door to deliver him from all his woes. We are bound down to life, ſaid *Michael Montaigne*, by the mereſt toys; by a glaſs: yes, and wherefore? Becauſe the ſentiment of immortality is impreſſed on that glaſs. If life and death frequently appear inſupportable to men, it is becauſe they aſſociate the ſentiment of their end with that of death, and the ſentiment of infinity with that of life. Mortals, if you wiſh to live happy, and to die in compoſure, do not let your Laws offer violence to thoſe of Nature. Conſider, that, at death, all the troubles of the animal come to a period; the cravings of the body, diſeaſes, perſecutions, calumnies, ſlavery of every kind, the rude combats of a man's paſſions with himſelf, and with

others.

others. Confider, that, at death, all the enjoyments of a moral Being commence; the rewards of virtue, and of the flighteft acts of juftice and of humanity, undervalued, perhaps, or defpifed by the World, but which have, in fome meafure, brought us nearer, while we were upon the Earth, to a Being righteous and eternal.

When thefe two inftincts unite, in the fame place, they confer upon us the higheft pleafure of which our nature is fufceptible; for, in that cafe, our two natures, if I may thus exprefs myfelf, enjoy at once *. I am going to trace a flight fketch of the combination of their harmonies; after which we fhall purfue the track of the celeftial fentiment which is natural to us, as manifefted in our moft ordinary fenfations.

Let me fuppofe you then, Reader, difgufted, and wearied out with the diforders of Society, in fearch of fome happy fpot toward the extremity of Africa, on which the foot of European never

* To thefe two inftincts may be referred all the fenfations of life, which frequently feem to be contradictory. For example, if habit and novelty be agreeable to us, it is that habit gives us confidence refpecting our phyfical relations, which are always the fame; and novelty promifes new points of view to our divine inftinct, which is ever aiming at the extenfion of it's enjoyments.

alighted.

alighted. Sailing along the Mediterranean, your vessel is tossed by the violence of the tempest, and shipwrecked upon a rock, just as it is beginning to grow dark. Through the favour of Heaven you scramble safe to land: you flee for shelter to a grotto, rendered visible by the glare of the lightning, at the bottom of a little valley. There, retired to the covert of this asylum, you hear, all night long, the thunder roaring, and the rain descending in torrents. At day-break, you discover behind you an amphitheatre of enormous rocks, perpendicularly steep as a wall. From their bases, here and there, start out clumps of fig-trees, covered over with white and purple fruit, and tufts of carobs loaded with brown pods; their summits are crowned with pines, wild olive-trees, and cypresses bending under the violence of the winds. The echos of these rocks repeat, in the air, the confused howling of the tempest, and the hoarse noise of the raging Sea, perceptible to the eye at a distance. But the little valley where you are, is the abode of tranquillity and repose. In it's mossy declivities the sea-lark builds her nest, and on these solitary strands the mavis expects the ceasing of the storm.

By this time the first fires of *Aurora* are lengthening over the flowery stachys, and the violet beds of thyme which clothe the swelling hillocks. The brightening

brightening rays disclose to view, on the summit of an adjoining eminence, a cottage overshadowed with trees. Out of it issue a shepherd, his wife, and his daughter, who take the path that leads to the grotto, with vases and baskets on their heads. It is the spectacle of your distress which attracts these good people toward you. They are provided with fire, fruits, bread, wine, clothing, for your relief. They vie with each other in rendering you the offices of hospitality. The wants of the body being satisfied, those of the mind begin to call for gratification. Your eye eagerly wanders along the surface of the deep, and you are enquiring within yourself, "On what part of the "World am I thrown?" The shepherd perceives your anxiety, and removes it, addressing you in these words: "That distant island which you see "to the North, is Mycone. There is Delos, a "little to the left, and Paros directly in front. "That in which we are is Naxos; you are on "that very part of the island where *Ariadne* was "formerly abandoned by *Theseus*. It was on that "long bank of white sand, which projects below "into the Sea, that she passed the days, with her "eyes rivetted on that point of the Horizon where "the vessel of her faithless lover at length ceased "to be visible; and into this very grotto, where "you now are, she retired, at night, to mourn "over his departure. To the right, between these

"two

" two little hills, on the top of which you behold " some confused ruins, stood a flourishing city, " named Naxos. It's female inhabitants, touched " with the misfortunes of the daughter of *Minos*, " resorted hither, to look for her, and to comfort " her. They endeavoured, at first, to divert her " attention by amusing conversation; but nothing " could give her pleasure, but the name, and the " recollection, of her beloved *Theseus*. These dam- " sels then counterfeited letters from that Hero, " breathing the tenderest affection, and addressed " to *Ariadne*. They flew to deliver them to her, " and said, Take comfort, beautiful *Ariadne*. " *Theseus* will soon return: *Theseus* thinks of no- " thing but you. *Ariadne*, in an extasy of delight, " read the letters, and, with a trembling hand, " hastened to answer them. The Naxian girls " took charge of her answers, and promised to " have them speedily conveyed to *Theseus*. In " this manner they amused her grief. But when " they perceived that the sight of the Sea plunged " her more and more into melancholy, they decoyed " her into those extensive groves which you observe " below in the plain. There they invented every " species of festivity, that could lull her fond re- " gret to rest. Sometimes they formed around her " choral dances, and represented, by the linking " of their hands, the various windings of the la- " byrinth of Crete, out of which, by her aid,

" escaped the happy *Theseus*: sometimes they af-
" fected to put to death the terrible *Minotaur*.
" The heart of *Ariadne* expanded to the percep-
" tion of joy, at the sight of representations which
" called to her remembrance the power of her fa-
" ther, the glory of her lover, and the triumph of
" her own charms, which had repaired the destiny
" of Athens: but when the winds conveyed to
" her ear, through the music of the tabor and of
" the flute, the distant noise of the billows break-
" ing on the shore from which she saw the cruel
" *Theseus* take his departure, she turned her face
" toward the Sea, and began to weep. Thus the
" Naxians were made sensible, that unfortunate
" love can find, in the very lap of gaiety, the
" means of embittering it's anguish; and that the
" recollection of pain is to be lost, only by losing
" that of pleasure. They endeavoured, therefore,
" to remove *Ariadne* from scenes and sounds
" which were continually recalling the idea of her
" lover. They persuaded her to visit their city,
" where they provided for her magnificent ban-
" quets, in superb apartments, raised on columns
" of granite. Into these, no male was permitted
" to enter, and no noise from without could make
" itself heard. They had taken care to cover the
" pavement, the walls, the doors, and the win-
" dows, with the richest tapestry, on which were
" represented meadows, vineyards, and enchanting

" solitudes.

" ſolitudes. A thouſand lamps and torches daz-
" zled the eye. They made *Ariadne* ſeat herſelf
" in the midſt of them on cuſhions; they placed
" a coronet of ivy, with it's black cluſters, upon
" her flaxen hair, and around her pale forehead;
" then they arranged, at her feet, urns of alabaſter
" repleniſhed with the choiceſt wines; they poured
" them out into cups of gold, which they pre-
" ſented to her, ſaying; Drink, lovely daughter
" of *Minos*; this iſland produces the richeſt pre-
" ſents of *Bacchus*. Drink, wine diſſipates care.
" *Ariadne*, with a ſmile, ſuffered herſelf to be per-
" ſuaded. In a little time, the roſes of health
" re-appeared on her countenance, and a report
" was immediately ſpread over Naxos, that *Bac-*
" *chus* was come to the relief of the miſtreſs of
" *Theſeus*. The inhabitants, tranſported with joy,
" reared a temple to that God, of which you ſtill
" ſee ſome columns and the frontiſpiece, on that
" rock, in the midſt of the waves. But wine only
" added fuel to the love of *Ariadne*. She gradu-
" ally pined away, a victim to her ſad regrets, and
" even to her fond hopes. See there, at the ex-
" tremity of this valley, on a little hillock, co-
" vered with marine-wormwood, is her tomb, and
" her ſtatue ſtill looking toward the Sea. You
" can ſcarcely now diſtinguiſh in it the figure of a
" female; but there is even now diſcernible in it
" the reſtleſs attitude of a lover. This monument,
" as

" as well as every other of the country, have been " mutilated by time, and ſtill more by the hand " of barbarians; but the memory of ſuffering vir- " tue is not, on the Earth, at the mercy of tyrants. " The tomb of *Ariadne* is in poſſeſſion of the " Turks, and her crown is planted among the " ſtars. As for us, eſcaped from the notice of the " powers of this World, by means of our very " obſcurity, we have, through the goodneſs of " Heaven, found liberty at a diſtance from the " Great, and happineſs in a deſert. Stranger, if " you are ſtill capable of being affected by the " bleſſings of Nature, it is in your power to ſhare " them with us."

At this recital, the gentle tears of humanity trickle down the cheeks of his ſpouſe, and of his youthful daughter, as ſhe breathes a ſigh to the memory of *Ariadne*; and I greatly doubt, whether an Atheiſt himſelf, who acknowledges nothing elſe in Nature but the Laws of matter and of motion, could be inſenſible to thoſe preſent correſpondencies, and thoſe ancient recollections.

Voluptuous men! Greece alone, you tell me, preſents ſcenes and points of view ſo tenderly affecting. *Ariadne*, accordingly, has a place in every garden; *Ariadne* preſents herſelf to view in every collection of painting. From the turret of your

your own caſtle, throw your eye over the plains below. As the proſpect gradually extends, it terminates in a Horizon much more beautiful than thoſe of deſolated Greece. Your apartment is more commodious than a grotto, and your ſophas much ſofter than the turf. The undulation, and the murmuring ſound of your flowery meadows are more grateful to the ſenſe than thoſe of the billows of the Mediterranean. Your money and your own gardens can ſupply you with greater variety of the choiceſt wines and fruits than all the iſlands of the Archipelago could produce. Would you blend with theſe delights that of Deity? Behold on yonder hill, that ſmall pariſh-church, encircled by aged elms. Among the young women who there aſſemble, under it's ruſtic portico, there may be, undoubtedly, ſome forlorn *Ariadne*, betrayed by a faithleſs lover *. She is not made of marble.

* There are, in our own plains, young females much more reſpectable than *Ariadne*, to whom our Hiſtorians, who make ſuch a parade of virtue, pay no manner of attention. A perſon of my acquaintance obſerved one Sunday, at the gate of a country-church, a young woman at prayer, quite alone, while they were chanting veſpers within. As he remained ſome time in the place, he obſerved, for ſeveral Sundays ſucceſſively, that ſame young woman, who never once entered the church during the ſervice. Being mightily ſtruck with this ſingularity of behaviour, he enquired into the meaning of it at ſome others of the female peaſants, who anſwered him, that it muſt be her own will

marble, but of living flesh and blood; she is not a Greek, but a French-woman; she is not comforted, but insulted by her companions. Visit her humble abode, and soothe her anguish. Do good in this life, which is passing away with the rapidity of a torrent. Do good, not out of ostentation, and by the hands of a stranger; but for the sake of Heaven, and with your own hand. The fruit of virtue loses it's flavour, when gathered by another, and not yourself. Ah! if you would, in person, speak an encouraging word to her, under that load of depression; if, by your sympathy, you raise her in her own esteem, you will perceive how, under a sense of your goodness, her forehead is overspread with a blush, her eyes suffused with tears, her convulsive lips move without speaking, and her heart, long oppressed with shame, expand to the approach of a comforter, as to the sentiment of the DEITY.

will merely that determined her to stop at the porch, as they knew of nothing that should prevent her going in, adding, that they had frequently urged her to accompany them, but in vain. At last, desirous of having the solution of this mystery, he addressed himself to the young woman herself, whose conduct appeared to him so very extraordinary. She appeared, at first, somewhat disconcerted, but presently collecting courage, "Sir," said she, "I had a lover who took advantage of my frailty. I "became pregnant, and my lover falling sick, died, without "making me his wife. It is my desire, that a voluntary exclu-"sion from church for life should serve as some atonement for "my fault, and as a warning to my companions."

You will then perceive, in the human figure, touches far beyond the reach of the chisels of Greece, and the pencil of a *Van Dyk*. The felicity of an unfortunate young woman will cost you much less than the statue of *Ariadne*: and instead of giving celebrity to the name of an artist in your hotel, for a few years, this will immortalize your own, and cause it to last, long after you are gone from hence, every time she says to her companions and to her children: " It was a God, who came to " succour me in the day of my distress."

We now proceed to trace the instinct of Divinity in our physical sensations, and shall conclude this Study, by the sentiments of the soul which are purely intellectual. Thus we shall attempt to convey a faint idea of the nature of Man.

OF PHYSICAL SENSATIONS.

All the physical sensations are, in themselves, so many testimonies of our misery. If Man is so sensible to the pleasure of the touch, it is because he is naked all his body over. He is under the necessity, in order to clothe himself, of stripping the quadruped, the plant, and the worm. If almost all vegetables and animals are laid under contribution to supply him with food, it is because he is obliged to employ

ploy a great deal of cookery, and many combinations, in preparing his aliments. Nature has treated him with much ſeverity; for he is the only one of animals, for the wants of which ſhe has made no immediate proviſion. Our philoſophers have not ſufficiently reflected on this perplexing diſtinction. How! a worm provided with it's auger or it's file; he enters into life in the midſt of a profuſion of fruit proper for his ſubſiſtence; he, by and by, finds in himſelf the means of ſpinning and weaving his own garment; after that, he transforms himſelf into a gaudy butterfly, who ranges uncontroled, abandoning himſelf to all the delights of love, and re-perpetuating his ſpecies without anxiety, and without remorſe; whereas the ſon of a King is born completely naked, amidſt tears and groans, ſtanding in need, all his life long, of the aſſiſtance of another; under the neceſſity of maintaining an unremitting conflict with his own ſpecies, from within, or from without, and frequently finding in himſelf his moſt formidable enemy! Of a truth, unleſs we are all the children of duſt, it would be a thouſand times better to enter upon exiſtence under the form of an inſect, than under that of an Emperor. But Man has been abandoned to the moſt abject miſery, only that he may have uninterrupted recourſe to the firſt of Powers.

Of the Senſe of Taſting.

There is no one phyſical ſenſation but what awakens in Man ſome ſentiment of the DEITY.

To begin with the groſſeſt of all our ſenſes, that which relates to eating and drinking; all Nations, in the ſavage ſtate, have entertained the belief that the DIVINITY had need to ſupport his life, by the ſame means that men do: hence, in all religions, the origin of ſacrifice. Hence, alſo, has farther proceeded, in many Nations, the cuſtom of placing viands on the tombs of the dead. The wives of the American ſavages extend this mark of ſolicitude even to infants who die upon the breaſt. After having beſtowed upon them the rights of ſepulture, they come once a day, for ſeveral weeks, and preſs from the nipple a few drops of milk upon the grave of the departed ſuckling*. This is poſitively affirmed by the Jeſuit *Charlevoix*, who was frequently an eye-witneſs of the fact. Thus the ſentiment of DEITY, and that of the immortality of the ſoul, are interwoven with our affections the moſt completely animal, and eſpecially with maternal tenderneſs.

* See Father *Charlevoix*, his Travels through America.

But

But Man has not satisfied himself with admitting intellectual beings to a share of his repast, and, in some measure, with inviting them to his table; he has found the means of elevating himself to their rank, by the physical effects of those very aliments. It is singularly remarkable, that several savage Nations have been discovered, who scarcely possessed industry sufficient to procure food for themselves; but not one who had not invented the means of getting drunk. Man is the only animal who is sensible to that pleasure. Other animals are content to remain in their sphere. Man is making perpetual efforts to get out of his. Intoxication elevates the mind. All religious festivals among Savages, and even among polished Nations, end in feasting, in which men drink till reason is gone: they begin, it is true, with fasting, but intoxication closes the scene. Man renounces human reason, that he may excite in himself emotions that are divine. The effect of intoxication is to convey the soul into the bosom of some deity. You always hear topers celebrating, in their songs, *Bacchus*, *Mars*, *Venus*, or the God of Love. It is farther very remarkable, that men do not abandon themselves to blasphemy till they arrive at a state of intoxication; for it is an instinct as usual to the soul, to cleave to the DEITY, when it is in it's natural state, as to abjure Him when it is corrupted by vice.

Of the Senſe of Smelling.

The pleaſures of ſmell are peculiar to Man; for I do not comprehend under it the olfactory emanations by which he forms a judgment of his aliments, and which are common to him with moſt animals. Man alone is ſenſible to perfumes, and employs them to give more energy to his paſſions. *Mahomet* ſaid, that they elevated his ſoul to Heaven. Whatever may be in this, the uſe of them has been introduced into all the religious ceremonies, and into the political aſſemblies, of many Nations. The Braſilians, as well as all the Savages of North-America, never deliberate on any object of importance, without ſmoking tobacco in a calumet. It is from this practice that the calumet is become, among all thoſe Nations, the ſymbol of peace, of war, of alliance, according to the acceſſories with which it is accompanied.

It is, undoubedly, from the ſame cuſtom of ſmoking, which was common to the Scythians, as *Herodotus* relates, that the caduceus of *Mercury*, which has a ſtriking reſemblance to the calumet of the Americans, and which appears, like it, to have been nothing but a pipe, became the ſymbol of commerce. Tobacco increaſes, in ſome meaſure,

ſure, the powers of the underſtanding, by producing a ſpecies of intoxication in the nerves of the brain. *Lery* tells us, that the Braſilians ſmoke tobacco till it makes them drunk. It is to be obſerved, that thoſe nations have found out the moſt cephalic plant of the whole vegetable kingdom, and that the uſe of it is the moſt univerſally diffuſed of all thoſe which exiſt on the Globe, the vine and the corn-plants not excepted. I have ſeen it cultivated in Finland, beyond Viburg, in about the ſixty firſt degree of North Latitude. The habit of uſing it becomes ſo powerful, that a perſon who has acquired it, will rather forego bread, for a day, than his tobacco. This plant is, nevertheleſs, a real poiſon; it affects, at length, the olfactory nerves, and ſometimes the ſight. But Man is ever diſpoſed to impair his phyſical conſtitution, provided he can ſtrengthen in himſelf the intellectual ſentiment.

Of the Senſe of Seeing.

Every thing that has been ſaid, in detailing certain general Laws of Nature, harmonies, conformities, contraſts, and oppoſitions, refers principally to the ſenſe of ſeeing. I do not ſpeak of adaptation, or correſpondence; for this belongs to the ſentiment of reaſon, and is entirely diſtinct from matter. The other relations are, in truth,

 founded

founded on the reaſon itſelf of Nature, which communicates delight to us by means of colours and forms generative and generated, and inſpires melancholy by thoſe which announce decompoſition and deſtruction. But, without entering upon that vaſt and inexhauſtible ſubject, I ſhall, at preſent, confine myſelf to certain optical effects, which involuntarily excite in us the ſentiment of ſome of the attributes of Deity.

One of the moſt obvious cauſes of the pleaſure which we derive from the ſight of a great tree, ariſes from the ſentiment of infinity kindled in us, by it's pyramidical form. The decreaſe of it's different tiers of branches, and tints of verdure, which are always lighter at the extremities of the tree, than in the reſt of it's foliage, give it an apparent elevation, which never terminates. We experience the ſame ſenſations in the horizontal plan of landſcapes, in which we frequently perceive ſeveral ſucceſſive hilly elevations flying away one behind another, till the laſt melt away into the Heavens. Nature produces the ſame effect in vaſt plains, by means of the vapours which riſe from the banks of the lakes, or from the channels of the brooks and rivers that wander through them; their contours are multiplied in proportion to the extent of the plain, as I have many a time remarked. Thoſe vapours preſent themſelves on different plans;

plans; sometimes they stand still, like curtains drawn along the skirts of the forests; sometimes they mount into columns over the brooks which meander through the meadows: sometimes they are quite gray; at other times they are illumined and penetrated by the rays of the Sun. Under all these aspects, they display to us, if I may venture to use the expression, several perspectives of infinity in infinity itself.

I say nothing of the delightful spectacle which the Heavens sometimes present to us, in the disposition of the clouds. I do not know of any Philosopher who has so much as suspected that their beauties were subjected to Law. One thing is certain, namely, that no one animal, which lives in the light, is insensible to their effects. I have spoken, in another place, somewhat of their characters of amability or terror, which are the same with those of amiable or dangerous animals and vegetables, conformably to those of the days and of the seasons which they announce. The Laws of them which I have sketched, will suggest delicious subjects of meditation to any person disposed to study them, excepting those who are determined to apply the mechanical medium of barometers and thermometers. These instruments are good for nothing but the regulation of the atmosphere of our chambers. They too frequently conceal

from

from us the action of Nature; they announce, in most instances, the same temperatures to the days which set the birds a-singing, and to those which reduce them to silence. The harmonies of Heaven are to be felt only by the heart of Man. All Nations, struck by their ineffable language, raise their hands and their eyes to Heaven, in the involuntary emotions of joy or of grief.

Reason, however, tells them that God is every where. How comes it that no one stretches out his arms toward the Earth, or to the Horizon, in the attitude of invocation? Whence comes the sentiment which whispers to them, *God is in Heaven?* Is it because Heaven is the place where light dwells? Is it because the light itself, which discloses all objects to us, not being, like our terrestrial substances, liable to be divided, corrupted, destroyed, and confined, seems to present something celestial in it's substance?

It is to the sentiment of infinity, which the sight of the Heavens inspires, that we must ascribe the taste of all Nations, for building temples on the summit of a mountain, and the invincible propensity which the Jews felt, like other Nations, to worship upon high places. There is not a mountain, all over the islands of the Archipelago, but what has it's church; nor a hill, in China, but what

what has it's pagoda. If, as ſome Philoſophers pretend, we never form a judgment of the nature of things, but from the mechanical reſults of a compariſon with ourſelves, the elevation of mountains ought to humiliate our inſignificance. But the truth is, that theſe ſublime objects, by elevating us toward Heaven, elevate thither the ſoul of Man, by the ſentiment of infinity; and, disjoining us from things terreſtrial, waft us to the enjoyment of beauties of much longer duration.

The works of Nature frequently preſent to us ſeveral kinds of infinity at once: thus, for example, a great tree, the trunk of which is cavernous, and covered with moſs, conveys to us the ſentiment of infinity as to time, as well as that of infinity in point of elevation. It exhibits a monument of ages when we did not exiſt. If to this is added infinity of extenſion, as when we perceive through it's ſolemn branches, objects prodigiouſly remote, our veneration increaſes. Go on, and add to all theſe, the different ridges of it's maſs, in contraſt with the profundity of the valleys, and with the level of the plains; it's venerable half-lights, which oppoſe themſelves to, and play with, the azure of the Heavens; and the ſentiment of our own wretchedneſs, which it relieves, by the ideas of the protection which it affords in the thickneſs of it's trunk, immoveable as the rock, and in it's auguſt

ſummit,

ſummit, agitated by the winds, the majeſtic murmurs of which ſeem to ſympathize with our diſtreſs. A tree, with all theſe harmonies, ſeems to inſpire an inexpreſſible religious awe. *Pliny* ſays, in conformity to this idea, that the trees were the firſt temples of the Gods.

The ſublime impreſſion which they produce, becomes ſtill more profound, when they recal to us ſome ſentiment of virtue, ſuch as the recollection of the great men who planted them, or of thoſe whoſe tombs they ſhade. Of this kind were the oaks of Iulus at Troy. It is from an effect of this ſentiment, that the mountains of Greece and Italy appear to us more reſpectable than thoſe of the reſt of Europe, though they are of no higher antiquity on the Globe, becauſe their monuments, in ruins as they are, call to our remembrance the virtues of the perſons who inhabited them. But this ſubject belongs not to the preſent article.

In general, the different ſenſations of infinity increaſe by the contraſts of the phyſical objects which produce them. Our Painters are not ſufficiently attentive to the choice of thoſe which they introduce into the fore-ground of their pictures. They would give a much more powerful effect to their back-ground ſcenery, if they oppoſed to it the frontiſpiece, not only in colours and forms, as

they

they ſome time do, but in nature. Thus, for example, if the Artiſt wiſhed to communicate an affecting intereſt to a cheerful and ſmiling landſcape, he would do well to preſent it through a magnificent triumphal arch, crumbling into ruin by length of time. On the contrary, a city filled with Tuſcan and Egyptian monuments, would have a ſtill greater air of antiquity, when viewed from under a bower of verdure and flowers. We ought to imitate Nature, who never produces the moſt lovely plants, in all their beauty, ſuch as moſſes, violets, and roſes, but at the foot of ruſtic rocks.

Not that conſonances do not likewiſe produce a very powerful effect, eſpecially when they ſeem to unite objects which are diſtinct from each other. It is thus, for inſtance, that the cupola of the College of the Four Nations, preſents a magnificent point of view, when ſeen from the middle of the court of the Louvre, through the arcade of that palace which is oppoſite, for then you view it complete, with a portion of the Heaven under the arch, as if it were a part of the Louvre. But in this very conſonance, which gives ſuch an extent to our viſion, there is likewiſe a contraſt in the concave form of the arcade, with the convex form of the cupola.

The

The great art of moving is to oppose sensible objects to intellectual. The soul, in that case, takes a daring soar. It passes from the visible to the invisible, and enjoys, if I may be allowed the expression, in it's own way, by extending itself into the unbounded fields of sentiment and of intelligence. Among certain Tartar Tribes, when a great man dies, his groom, after the interment, leads out the horse which his master was accustomed to ride, places the clothes which he wore on the horse's back, and walks him, in profound silence, before the assembly, who, by that spectacle are melted into tears.

When the suppressed circumstances multiply, and unite themselves to some virtuous affection, the emotions of the soul are greatly heightened. Thus when, in the Æneid, *Iulus* is promising to make presents to *Nisus* and *Euryalus*, who are going in quest of his father to *Palanteum*, he says to *Nisus*:

Bina dabo argento perfecta atque aspera signis
Pocula, devictâ genitor quæ cepit Arisbâ;
Et tripodes geminos, auri duo magna talenta,
Cratera antiquum quem dat Sidonia Dido.

Æneid, Lib. ix. v. 263.

Two silver cups, emboss'd with nicest art,
I'll give, of warlike spoils my Father's part,
When fam'd Arisba fell; two tripods old;
A double talent, too, of purest gold;
Sidonian Dido's gift shall crown the rest,
A bowl antique, of generous love the test.

"I will

"I will preſent you with two ſilver cups of exquiſite workmanſhip, with curious figures in alto-relievo. They became my father's property at the capture of Ariſba. To theſe I will add a pair of twin tripods; two talents of maſſy gold; and an ancient goblet, a token of affection from Queen *Dido*."

He promiſes to the two youthful friends, united to each other in the tendereſt bonds, double preſents, two cups, two tripods to ſerve as ſtands for them, after the manner of the ancients, two talents of gold to repleniſh them with wine, but only one bowl from which they might drink together. And then, what a bowl! he boaſts neither of the materials of which it is compoſed, nor of the workmanſhip, as in the caſe of the other preſents; he connects it with moral qualities infinitely more intereſting to the heart of friendſhip. It is antique; it was not the prize of violence, but the gift of love. *Iulus*, no doubt, received it as a mark of affection from *Dido*, when ſhe conſidered herſelf to be the wife of *Æneas*.

In all the ſcenes of paſſion, where the intention is to produce ſtrong emotions, the more that the principal object is circumſcribed, the more extended is the intellectual ſentiment reſulting from it. Several reaſons might be aſſigned for this, the

moſt

moſt important of which is, that the acceſſory contraſts, as thoſe of littleneſs and greatneſs, of weakneſs and ſtrength, of finite and infinite, concur in heightening the contraſt of the ſubject. When *Pouſſin* conceived the idea of a picture of the univerſal deluge, he confined it to the repreſentation of a ſingle family. There you ſee an old man on horſeback, on the point of drowning; and in a boat, a man, who is perhaps his ſon, preſents to his wife, who has made ſhift to ſcramble up a rock, a little child dreſſed in a red petticoat, who, on it's part, is making every effort, with it's little feet, to get upon the rock. The back-ground of the landſcape is frightful from it's black melancholy. The herbage and the trees are ſoaked in water, the Earth itſelf is penetrated by it, which is rendered viſible by that long ſerpent, in eager haſte to quit it's hole. The torrents are guſhing down on every ſide; the Sun appears in the Heavens like an eye thruſt out of it's ſocket: but the moſt powerful intereſt in the piece bears upon the feebleſt object: a father and a mother, ready themſelves to periſh, are wholly engroſſed in the preſervation of their infant. Every feeling is extinguiſhed on the Earth, but maternal tenderneſs is ſtill alive. The human race is deſtroyed becauſe of it's crimes, and innocence is going to be involved in the puniſhment. Theſe unreſtrained torrents, that deluged Earth, that lurid Atmo-

ſphere,

ſphere, that extinguiſhed Sun, thoſe deſolated ſolitudes, that fugitive family, all the effects of that univerſal ruin of the World, are wholly concentrated in an infant. There is no one, however, who, on viewing the ſmall group of perſonages which ſurround it, would not exclaim: "There's the Univerſal Deluge!" Such is the nature of the human ſoul; ſo far from being material, it lays hold only of correſpondencies. The leſs you diſplay to it phyſical objects, the more you awaken in it intellectual feelings.

Of the Senſe of Hearing.

Plato calls hearing and ſeeing the ſenſes of the ſoul. I ſuppoſe he qualifies them particularly by this name, becauſe viſion is affected by light, which is not, properly ſpeaking, a ſubſtance; and hearing, by the modulations of the air, which are not of themſelves bodies. Beſides, theſe two ſenſes convey to us only the ſentiment of correſpondencies and harmonies, without involving us in matter, as ſmelling does, which is affected only by the emanations from bodies, taſting by their fluidity, and touching by their ſolidity, by their ſoftneſs, by their heat, and by their other phyſical qualities. Though hearing and ſeeing be the direct ſenſes of the ſoul, we ought not, however,

thence to conclude, that a man born deaf and blind must be an idiot, as ſome have pretended. The ſoul ſees and hears by all the ſenſes. This has been demonſtrated in the caſe of the blind Princes of Perſia, whoſe fingers, according to *Chardin*'s report, are ſo aſtoniſhingly intelligent, that they can trace, and calculate, all the figures of Geometry on tablets. Such are, likewiſe, the deaf and the dumb, whom the *Abbé de l'Epée*, is teaching to converſe together.

I have no occaſion to be diffuſe on the ſubject of the intellectual relations of hearing. This ſenſe is the immediate organ of intelligence; it is that which is adapted to the reception of ſpeech, a faculty peculiar to Man, and which, by it's infinite modulations, is the expreſſion of all the correſpondencies of Nature, and of all the feelings of the human heart. But there is another language, which ſeems to appertain ſtill more particularly to this firſt principle of ourſelves, to which we have given the name of *ſentiment*: I mean muſic.

I ſhall not dwell on the incomprehenſible power which it poſſeſſes of rouſing and quieting the paſſions, in a manner independent of reaſon, and of kindling ſublime affections, diſengaged from all intellectual perception: it's effects are ſufficiently known. I ſhall only obſerve, that it is ſo natural

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to Man; that the firft prayers addreffed to the DEITY, and the original Laws among all Nations, were fet to mufic. Man lofes a tafte for it only in polifhed fociety, the very languages of which, at length, lofe their accentuation. The fact is, that a multitude of focial relations deftroy, in a ftate of refinement, the correfpondencies of Nature. In that ftate, we reafon much, but fcarcely feel any longer.

The AUTHOR of Nature has deemed the harmony of founds to be fo neceffary to Man, that there is not a fituation upon the Earth but what has it's finging bird. The linnet of the Canaries ufually frequents, in thofe iflands, the flinty gutters of the mountains. The goldfinch delights in fandy downs, the lark in the meadows, the nightingale in woods by the fide of a brook, the bullfinch, whofe note is fo fweet, in the white thorn: the thrufh, the yellowhammer, the greenfinch, and all other finging birds, have their favourite poft. It is very remarkable, that all over the Globe they difcover an inftinct which attracts them to the habitation of Man. If there be but a fingle hut in a foreft, all the fong-birds of the vicinity come and fettle around it. Nay, none are to be found except in places which are inhabited. I have travelled more than fix hundred leagues, through the forefts of Ruffia, but never met with fmall birds except in the neighbourhood of villages. On mak-

ing the tour of the fortified places of Ruſſian Finland, with the General Officers of the Corps of Engineers, in which I ſerved, we travelled ſometimes at the rate of twenty leagues a day, without ſeeing on the road either village or bird. But when we perceived the ſparrows fluttering about, we concluded that we muſt be drawing near ſome inhabited place. In this indication we were never once deceived. I relate it with the more ſatisfaction, that it may ſometimes be of ſervice to perſons who have loſt their way in the woods.

Garcillaſo de la Vega informs us, that his father having been detached from Peru, with a company of Spaniards, to make diſcoveries beyond the Cordeliers, was in danger of periſhing with hunger in the midſt of their uninhabited valleys and quagmires. He never could have got out, had he not perceived in the air a flight of paroquets, which ſuggeſted a hope that there might be ſome place of habitation at no great diſtance. He directed his march to that point of the compaſs which the paroquets had purſued, and arrived, after incredible fatigue, at a colony of Indians, who cultivated fields of maize.

It is to be obſerved, that Nature has not given a muſical voice to any one ſea or river bird, becauſe it would have been loſt in the noiſe of the

waters,

waters, and becaufe the human ear could not have enjoyed it at the diftance which they are deftined to live from the land. If there are fwans which fing, as has been alleged by fome, their fong muft confift of but very few modulations, with fome refemblance to the uncouth founds uttered by the duck and the goofe. That of the wild fwans, which came lately and fettled at Chantilly, has only four or five notes. Aquatic birds have fhrill and piercing cries, by means of which they can make themfelves heard in the regions of wind and tempeft where they inhabit, and are in perfect correfpondence with their noify fituations, and their melancholy folitudes.

The melodies of fong-birds have fimilar relations to the fites which they occupy, and even to the diftances at which they live from our habitations. The lark, who neftles among our corn, and delights in foaring perpendicularly till we lofe fight of him, makes his voice to be heard in the air, after he is no longer perceptible to the eye. The fwallow, who grazes the walls of our houfes as he flies, and repofes on our chimneys, has a fmall gentle chirping voice, which does not ftun the ear, as that of the fongfters of the grove would do; but the folitary nightingale makes himfelf heard at the diftance of more than half a league. He miftrufts the vicinity of man; and, neverthelefs,

lefs, always places himfelf within fight of his habitation, and within the reach of his ear. He choofes, for this effect, places which are the beft conductors of found, in order that their echoing may give more action to his voice. Having ftationed himfelf in his orcheftra, he warbles an unknown drama, which has it's exordium, it's expofition, it's recitative, it's cataftrophe, intermingled fometimes with the moft extravagant burfts of joy, fometimes with bitter and plaintive notes of recollection, which he expreffes by long and deep fighs. He raifes his fong at the commencement of that feafon which renews the face of Nature, and feems to prefent Man with a reprefentation of the reftlefs career which lies before him.

Every bird has a voice adapted to the times and the ftations of it's deftination, and relative to the wants of Man. The loud clarion of the cock calls him up to labour at the dawn of day. The brifk and lively fong of the lark, in the meadow, invites the fwains and fhepherdeffes to the dance; the voracious thrufh, which appears only in Autumn, fummons the ruftic vine-dreffer to the vintage. Man alone, on his part, is attentive to the accents of the feathered race. Never will the deer, who fheds tears copioufly over his own misfortunes, figh over thofe of the complaining Philomel. Never did the laborious ox, when led to the flaughter,

after

after all his painful ſervices, turn his head toward her, and ſay: "Solitary bird, behold in what "manner Man rewards his ſervants!"

Nature has diffuſed theſe diſtractions, and theſe conſonances of fortune, over volatile beings, in order that our ſoul, ſuſceptible as it is of every wo, finding every where occaſions of extending that ſuſceptibility, might every where be enabled to alleviate the preſſure. She has rendered inſenſible bodies themſelves capable of theſe communications. She preſents to us, frequently, in the midſt of ſcenes which pain the eye, other ſcenes which delight the ear, and ſoothe the mind with intereſting recollections. It is thus that from the boſom of foreſts, ſhe tranſports us to the brink of the waters, by the ruſtling of the aſpins and of the poplars. At other times ſhe conveys to us, when we are by the ſide of the brook, the noiſe of the Sea, and the manœuvres of navigation, in the murmuring of reeds ſhaken by the wind. When ſhe can no longer ſeduce our reaſon by foreign imagery, ſhe lulls it to reſt by the charm of ſentiment: ſhe calls forth from the boſom of the foreſts, of the meadows, and of the valleys, ſounds ineffable, which excite in us pleaſing reveries, and plunge us into profound ſleep.

Of the Senſe of Touching.

I ſhall make but a few reflections on the ſenſe of touching. It is the moſt obtuſe of all our ſenſes, and, nevertheleſs, it is, in ſome ſort, the ſeal of our intelligence. To no purpoſe is an object expoſed to the examination of the eye, in every poſſible poſition; we cannot be perſuaded that we know it, unleſs we are permitted to put it to the touch. This inſtinct proceeds, perhaps, from our weakneſs, which ſeeks in theſe approximations points of protection. Whatever may be in this, the ſenſe in queſtion, blunt as it is, may be made the channel of communicating intelligence, as is evident from the example adduced by *Chardin*, of the blind men of Perſia, who traced geometrical figures with their fingers, and formed a very accurate judgment of the goodneſs of a watch, by handling the parts of the movement.

Wiſe Nature has placed the principal organs of this ſenſe, which is diffuſed over the whole ſurface of our ſkin, in our hands and feet, which are the members the beſt adapted to judge of the quality of bodies. But in order that they might not be expoſed to the loſs of their ſenſibility, by frequent ſhocks, ſhe has beſtowed on them a great degree

of

of pliancy, by dividing them into ſeveral fingers and toes, and theſe again into ſeveral joints; farther, ſhe has furniſhed them, on the points of contact, with elaſtic half-pincers, which preſent, at once, reſiſtance in their callous and prominent parts, and an exquiſite ſenſibility in the retreating parts.

It is matter of aſtoniſhment to me, however, that Nature ſhould have diffuſed the ſenſe of touching over the whole ſurface of the human body, which becomes thence expoſed to variety of ſuffering, while no conſiderable benefit ſeems to reſult from it. Man is the only animal laid under the neceſſity of clothing himſelf. There are, indeed, ſome inſects which make caſes for themſelves, ſuch as the moth; but they are produced in places where their clothing is, if I may ſay ſo, ready made. This neceſſity, which is become one of the moſt inexhauſtible ſources of human vanity, is, in my opinion, one of the moſt humiliating proofs of our wretchedneſs. Man is the only being who is aſhamed of appearing naked. This is a feeling of which I do not diſcern the reaſon in Nature, nor the ſimilitude in the inſtinct of other animals. Beſides, independently of all ſenſe of ſhame, he is conſtrained, by powerful neceſſity, to clothe himſelf, in every variety of climate.

Certain

Certain Philoſophers, wrapped up in good warm cloaks, and who never ſtir beyond the precincts of our great cities, have figured to themſelves a natural Man on the Earth, like a ſtatue of bronze in the middle of one of our ſquares. But to ſay nothing of the innumerable inconveniencies which muſt, in ſuch a ſtate, oppreſs his miſerable exiſtence from without, as the cold, the heat, the wind, the rain, I ſhall inſiſt only on one inconvenience, which is but ſlightly felt in our commodious apartments, though it would be abſolutely inſupportable to a naked man, in the moſt genial of temperatures; I mean the flies. I ſhall quote, to this purpoſe, the teſtimony of a man whoſe ſkin ought to have been proof againſt this attack: it is that of the free-booter *Raveneau de Luſſan*, who, in the year 1688, croſſed the iſthmus of Panama, on his return from the South Seas. Hear what he ſays, ſpeaking of the Indians of Cape de Gracias a Dios: "When they are overtaken with an inclination to go to ſleep, they dig a hole in the ſand, in which they lay themſelves along, and then cover themſelves all over with the ſand which they had dug out; this they do to ſhelter themſelves from the attack of the muſquitos, with which the air is frequently loaded. They are a kind of little flies, that are rather felt than ſeen, and are armed with a ſting ſo keen, and ſo

"venemous

" venemous, that when they fix on any one, they " ſeem to dart a ſhaft of fire into the blood.

" The poor wretches are ſo grievouſly tormented " with thoſe formidable inſects, when it does not " blow, that they become like lepers; and I can " affirm it as a ſerious truth, for I know it from " my own experience, that it is no ſlight evil to " be attacked by them; for, beſides their pre- " venting all reſt in the night-time, when we were " obliged to trudge along, with our backs naked " for want of ſhirts, the unceaſing perſecution of " thoſe mercileſs little animals drove us almoſt to " madneſs and deſpair *."

It is, I am diſpoſed to believe, on account of the troubleſomeneſs of the flies, which are very common, and very neceſſary, in the marſhy and humid places of hot countries, that Nature has placed but few quadrupeds with hair, on their ſhores, but quadrupeds with ſcales, as the tatou, the armadillo, the tortoiſe, the lizard, the crocodile, the cayman, the land-crab, bernard-the-hermit, and other ſcaly reptiles, ſuch as ſerpents, upon which the flies have not the means of faſtening. It is, perhaps, for this reaſon, likewiſe, that hogs and wild-boars, which take pleaſure in frequenting

* Journal of a Voyage to the South-Sea in 1688.

ſuch

ſuch places, are furniſhed with hair long, ſtiff, and briſtly, which keep volatile inſects at a diſtance.

Once more, Nature has not employed, in this reſpect, any one precaution in behalf of Man. Of a truth, on contemplating the beauty of his forms, and his complete nakedneſs, it is impoſſible for me not to admit the ancient tradition of our origin. Nature, in placing him on the Earth, ſaid to him: "Go, degraded creature, animal deſtitute of clothing, intelligence without light; go, and provide "for thy own wants; it ſhall not be in thy power "to enlighten thy blinded reaſon, but by directing "it continually toward Heaven, nor to ſuſtain thy "miſerable life, without the aſſiſtance of beings "like thyſelf." And thus, out of the miſery of Man, ſprung up the two commandments of the Law.

END OF THE THIRD VOLUME.